# A HAND-BOOK

TO THE

# FLORA OF CEYLON.

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CONTAINING

DESCRIPTIONS OF ALL THE SPECIES OF FLOWERING PLANTS INDIGENOUS TO THE ISLAND,

AND

NOTES ON THEIR HISTORY, DISTRIBUTION, AND USES.

BY

HENRY TRIMEN, M.B. (LOND.), F.R.S.

DIRECTOR OF THE ROYAL BOTANIC GARDENS, CEYLON.

CONTINUED BY

SIR J. D. HOOKER, G.C.S.I., C.B., F.R.S.

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With an Atlas of Plates

ILLUSTRATING SOME OF THE MORE INTERESTING SPECIES.

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## Part V.

ERIOCAULONEÆ—GRAMINEÆ.

*WITH MAPS I. & II., AND INDEXES.*

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# CXLVII.—ERIOCAULONEÆ.

SCAPIGEROUS, annual or perennial herbs, rarely aquatic; l. narrow, base sheathing, venation parallel; infl. a solitary globose or hemispheric head of densely packed, minute, usually white, unisexual fl., terminating a ped. with a tubular basal sheath; heads androgynous, rarely unisexual, involucrate by short scarious or chartaceous bracts; fl. often more or less hoary with short white hairs, densely crowded on a flat, convex, hemispheric or conical, glabrous or villous receptacle, solitary in the axil of a cuneiform bracteole which is as long as or longer than the flower and dorsally hoary at the top; male fl. stipitate, sep. 2–3, free or connate, hyaline, deciduous, rarely 2 or 0; corolla stipitate, funnel-shaped, 3-lobed, lobes minute, one sometimes much longer than the others; stam. 6 or fewer, inserted at the base of the corolla, fil. short, often unequal, anth. didymous, 2-celled, usually black, pistillode 0; fem. fl. sessile or stipitate, sep. 3, rarely 2, 1, or 0, unequal, usually concave, deciduous; corolla sessile on the calyx or stipitate, pet. 3, unequal, broad or narrow, persistent, with often a black spot on the limb; ov. superior, sessile or stipitate, globose, 3-lobed, 3-celled, cells with 1 pendulous ovule; style rather short, stigmas 3, erect, filiform; fr. a very small, membranous, 3-celled, loculicidal capsule; seeds very minute, oblong or ellipsoid, smooth, striate, or ribbed, endosperm floury, embryo minute.

## ERIOCAULON, *L.*

For characters, see Order.—Sp. about 150; 43 in *Fl. B. Ind.*

Submerged aquatics, with capillary l.
  Bracts and bracteoles glabrous . . . 1. E. SETACEUM.
  Bracts and bracteoles pubescent . . . 2. E. CAPILLUS-NAIADIS.
Terrestrial (or E. *fluviatile* aquatic).
  One pet. of male fl. protruded beyond the bracteoles.
    Bracteoles acute or obtuse.
      Heads $\frac{1}{2}$–$\frac{2}{3}$ in. diam. . . . . . 3. E. CAULESCENS.
      Heads $\frac{1}{3}$–$\frac{1}{2}$ in. diam. . . . . . 4. E. ZEYLANICUM.
    Bracteoles cuspidate.
      Cusps of bracteoles long . . . 5. E. LONGICUSPIS.
      Cusps of bracteoles short . . . 6. E. ATRATUM.

Pet. of male fl. not exceeding the bracteoles.
Seeds with (usually papillose) ridges.
Pet. of fem. fl. filiform. bearing a pencil of long hairs.
Scapes 6–18 in., heads $\frac{1}{4}$–$\frac{1}{3}$ in. . . 7. E. SEXANGULARE.
Scapes 2–6 in., heads $\frac{1}{6}$–$\frac{1}{4}$ in. . . 8. E. THWAITESII.
Pet. of fem. fl. flat, ciliate.
Recept. villous, with long hairs.
Stout, perennial . . . . 9. E. BROWNIANUM.
Annual . . . . . 10. E. LUZULAEFOLIUM.
Recept. glabrous, or nearly so.
Heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam. . . . 11. E. TRUNCATUM.
Heads $\frac{1}{10}$–$\frac{1}{8}$ in. diam. . . . 12. E. TRIMENI.
Seeds not ridged.
Recept. villous with long hairs.
Male pet. all very small.
L. 6–14 in., scapes 6–12 in. . . 13. E. WIGHTIANUM.
L. 1–4 in.
Scapes 6–8 in. . . . . 14. E. WALKERI.
Scapes 1–4 in. . . . . 15. E. QUINQUANGULARE.
Male pet. well developed, one largest 16. E. COLLINUM.
Recept. glabrous, or nearly so.
Annual, terrestrial, l. 1–2 in. . . 17. E. SIEBOLDIANUM.
Perennial, aquatic, l. 8–10 in. . . 18. E. FLUVIATILE.

1. **E. setaceum,** *L. Sp. Pl.* 87 (1753). **Penda,** *S.*
Herm. Mus. 8. Burm. Thes. 109. Fl. Zeyl. n. 50. Moon, Cat. 9. Thw. Enum. 341. C. P. 791 (in part).
Fl. B. Ind. vi. 572. Rheede, Hort. Mal. xii. t. 68.

A submerged aquatic; stem 2–3 ft., stout or slender, simple or rarely branched, flexuous, densely crinite throughout with capillary flexuous 1-veined l. $1\frac{1}{2}$–2 in. long, tips of stem or of branches floating; scapes very many, $1\frac{1}{2}$–3 in. long, slender, 5-ribbed, sheath $\frac{3}{4}$–1 in., tip truncate, membranous; heads about $\frac{1}{6}$ in. diam., nearly black; bracts short, cuneate-obovate, coriaceous, glabrous; recept. hemispheric, villous; bracteoles cuneiform or cymbiform, acuminate, glabrous; male fl.:—sep. 3, linear-oblong, obtuse, concave, glabrous, cor.-lobes minute, stam. 6; fem. fl. very shortly stipitate, sep. 3, cymbiform, acute, glabrous or nearly so, cor. shortly stipitate, pet. 3, very narrowly spathulate, ciliate towards the tips, with or without a black spot; seeds $\frac{1}{50}$ in. long, oblong, quite smooth, dark brown.

In rather deep water, in the moist low country below 1000 ft.; rare. Fl. Dec.–March.
Also in Malabar.

2. **E. Capillus-naiadis,** *Hook. f. Fl. Brit. Ind.* vi. 572 (1893). C. P. 791 (in part).

Habit and foliage of *E. setaceum;* heads globose, $\frac{1}{6}$ in. diam.; white, bracts short, cuneate-obovate, thinly coriaceous, pale;

recept. hemispheric, sparsely hairy, bracteoles cuneiform, tips rounded, cuspidate, dorsally villous with white hairs above the middle, male and fem. fl. shortly stipitate; male sep. 3, obovate-oblong, concave, dorsally villous above the middle with white hairs; fem. sep. cymbiform, cor. with ov. very shortly stipitate, pet. narrowly spathulate, ciliate towards the tip; ov. subsessile; seeds $\frac{1}{80}$ in. long, oblong, smooth, dark brown.

Deep water, in the moist low country below 2000 ft.; Pelaiwatte, Hewesse, Pasdun Korale. Fl. Dec.–March.

Also in the Concan, Bengal, Burma, and Cochin China.

In the Peradenya Herbarium this occurs mixed with *E. setaceum*, of which it was probably considered (possibly correctly) a form, by Thwaites and Trimen. The colour of the heads, due to the copious white hairs of the fl. bracts, distinguishes it at a glance. The receptacle is less hairy than in the Continental specimens, and the seeds are smaller.

3. **E. caulescens,** *Hk. f. and Th. in Fl. B. Ind.* vi. 572 (1893). *E. atratum*, var. *major*, Thw. Enum. 341. C. P. 131.

Stem in young plants simple, 3–4 in. long, as thick as the thumb, in old, often copiously branched, with branches 6–10 in. long, and leafy throughout, rooting along the elongate base; roots stout, flexuous; l. 2–6 by $\frac{1}{6}$–$\frac{1}{2}$ in., narrowed from the base to the obtuse tip, rigidly coriaceous, quite opaque, veins very many, close-set, faint; scape subsolitary from the stem or branches, 6–18 in., stout or slender, sheath 1–6 in., tip obtuse or acute, coriaceous or membranous towards the side; heads $\frac{1}{2}$–$\frac{2}{3}$ in. diam., bracts sub 3-seriate, coriaceous, oblong, outer obtuse, inner acute, almost black, shining; recept. flat, covered with very long straight hairs, bracteoles oblanceolate, acute, dark, dorsally shortly bearded; sep. and pet. of both sexes villously bearded, male fl. with 1 pet. much exceeding the bracteoles, obovate, villous all over; fem. fl. with 2 sep. concave, 1 flat, cor. stipitate, pet. very unequal, spots large, stipes of cor. and of ov. villous; seeds not seen.

Upper montane zone, alt. 5000–8000 ft.; very rare. Adam's Peak, plentiful; Horton Plains, swamp on Pidurutalagala, 8000 ft. (Pearson). Fl. Feb.

Endemic.

Our largest and most handsome species, semi-shrubby when old.

4. **E. zeylanicum,** Körn. in Linnæa, xxvii. (1854), 667 (ceylanicum). *E. subcaulescens*, Hk. f. in Fl. B. Ind. vi. 573 (1893). *E. atratum*, Thw. Enum. 341 (part). C. P. 61 (part).

Fl. B. Ind. vi. 585 (*ceylanicum*).

Stem 3–4 in., as thick as the little finger or less, simple, densely leafy; l. 2–3 by $\frac{1}{8}$ in., erect, linear, acute or mucronate, thick, opaque, many-veined, sheath slightly woolly at the base within; scapes 1–3, 6–12 in., slender, strongly 7-ribbed, sheath

1–3 in., tip membranous; heads $\frac{1}{3}$–$\frac{1}{2}$ in. diam., depressed-spherical, pale or snow-white; bracts broadly obovate or oblong, scarious, glabrous, at length reflexed, straw-col'd.; receptacle small, hemispheric, densely villous with long pale hairs; bracteoles cuneately oblanceolate, acute, bearded at the tip, membranous; male fl. shortly stipitate, sep. spathulate, 2 concave, 1 flat, one pet. much the longest, obovate, exceeding the bracteole, villous all over, stam. 6; fem. fl. subsessile, sep. of male, corolla subsessile, pet. narrowly oblanceolate, very unequal, villous, disk with a black spot; seeds subglobose $\frac{1}{50}$ in. diam., papillose.

Upper montane zone; rare. Nuwara Eliya (Gardner); Pidurutalagala (Thwaites); Horton Plains, alt. 7200 ft. (Pearson). Fl. April. Endemic.

5. **E. longicuspis,** *Hk. f. in Fl. B. Ind.* vi. 573 (1893).
*E. cristatum*, var., Thw. Enum. 341. C. P. 789.
Fl. B. Ind. vi. 573.

Stem short, as thick as a swan's quill; l. 2–2$\frac{1}{2}$ in., linear-subulate, acuminate, flat, many-veined, opaque, coriaceous sheath obscurely villous at the base within; scapes 1 or 2, 18–20 in., very slender, weak, flexuous, tip of sheath membranous; heads $\frac{1}{3}$ in. diam., the black cusps of the bracteoles contrasting with the small white fl.; bracts very small, cuneately obovate, scarious, blackish; recept. hemispheric, clothed with long hairs; bracteoles cuneiform, tips rounded, toothed, and with a long black cusp, glabrous or the inner dorsally villous; male and fem. fl. stipitate, male sep. 3, narrow, concave, tips hairy, one lobe of cor. much exceeding the bracteoles, villous, spathulate, stam. 6; fem. sep. 3, linear-oblong, stipitate, pet. narrowly spathulate, ciliate, each with a black spot; seeds not seen.

Lower montane zone; very rare. Ramboda (Gardner). Fl. Jan. Endemic.

6. **E. atratum,** *Körn. in Linnæa*, xxvii. 610 (1854).
Thw. Enum. 241. C. P. 61 (part).
Fl. B. Ind. vi. 574.

Stem 1–4 in., densely tufted, erect or decumbent, and sometimes branched, as thick as a swan's quill at the base or more slender; l. 4–6 by $\frac{1}{16}$–$\frac{1}{10}$ in., narrowly linear, obtuse or acute, erect or spreading from an erect base, thick in texture, veins very many and close-set, sheath more or less woolly at the base within; scape solitary, 6–12 in., tip of sheath membranous; head $\frac{1}{3}$–$\frac{1}{2}$ in. diam., hemispheric; bracts cuneately obovate, incurved, rigid, convex, black, grey, or yellowish, shining, glabrous, inner acute; recept. hemispheric, densely

villous with long hairs; bracteoles orbicular-ovate, black, dorsally shortly bearded above the middle, outer very shortly cuspidate, inner acute, male fl. stipitate, sep. 3, obovate, dorsally densely villous, one lobe of corolla much the longest, much exceeding the bracteoles, obovate, villous all over, stam. 6; fem. fl. subsessile, 2 sep. concave, 1 narrower, flat, cor. sessile or stipitate, pet. 3, oblanceolate, villous, 2 or all with a black spot; seeds not seen.

Montane zone; rather common. Galagama (Gardner); Maskeliya; Moist places in Central Province, alt. 6000–8000 ft. (Pearson). Fl. Feb., March.

Endemic.

Gardner's number for this was 932, not 972 as in Herb. Kew. Mr. Pearson has collected specimens with the invol. bracts varying as described above.

7. **E. sexangulare,** *L. Sp. Pl.* 87 (1753). **Kokmota,** S. Herm. Mus. 7. Burm. Thes. 108. Fl. Zeyl. n. 49. *E. Wallichianum*, Mart.; Thw. Enum. 341; Trim. Syst. Cat. Ceyl. 99. C. P. 220. Fl. B. Ind. vi. 580. Wall. Pl. As. Rar. t. 249.

Stem as thick as the little finger or less, short, rarely elongate; l. 4–12 by $\frac{1}{4}$–$\frac{3}{4}$ in. broad at the base, narrowed from the base to the subacute or acuminate tip, thin, many-veined, opaque, striate, drying brown; scapes many, tall, up to 18 in. high, slender, stiff, stoutly 5-ribbed, sheath 3–6 in., herbaceous, tip ending in a long green point; heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam., globose, hemispheric or conical, sometimes viviparous, hard, hoary, base truncate, at length intruded; bracts short, subquadrate or orbicular, spreading, rigidly coriaceous, closely appressed to the fl., glabrous, yellow, shining; recept. globose, hemispheric or columnar, sparsely hairy; bracteoles densely imbricate, broadly cuneate-spathulate, cuspidate, rigid, tip dark, hoary with snow-white powdery pubescence; male fl. quite flat, sep. free or connate, flabelliform, crenate-toothed, glabrous, cor.-lobes minute, triangular, ciliate, stam. 6; fem. fl. strongly compressed, subsessile, sep. 3, 2 very large, dolabriform and cymbiform, acute, incurved, dorsally broadly winged, third small, linear, flat, pet. filiform, terminated by a pencil of long hairs; seeds oblong or subglobose, $\frac{1}{40}$ in. diam., red-brown, ribbed, ribs papillose.

Wet places in moist low country; very common. Abundant in the cinnamon gardens, Colombo. Fl. Dec., March, July.

In Tropical Asia generally; Madagascar.

According to Continental Indian specimens the male fl. vary greatly, sometimes approaching the fem. in the form of the sepals, or are, with them, very much reduced.

8. **E. Thwaitesii,** *Körn. in Linnæa*, xxvii. 627 (1854). *E. Neesianum*, Körn. l. c. 628.
*E. truncatum*, Thw. Enum. 341 (part). C. P. 790 (part).
Fl. B. Ind. vi. 583.

Stem very short, stout, sometimes as thick as the little finger; l. 2–10 by $\frac{1}{6}$–$\frac{1}{3}$ in. broad in the middle, subulate, linear, or ensiform, acute or acuminate, opaque, 3–5-veined; scapes many, 2–6 in., slender, flexuous, 5-ribbed, tip of sheath acuminate, herbaceous; heads $\frac{1}{6}$–$\frac{1}{4}$ in. diam., hemispheric or obconic, hoary, base at length intruded; bracts obovate-oblong or nearly orbicular, spreading and incurved, glabrous, coriaceous, shining, pale straw-col'd.; recept. convex, densely villous with long hairs; bracteoles cuneately oblanceolate or spathulate, acute or obtuse, greyish, scarious, dorsally hoary above the middle; male fl. stipitate, stipes crinite with long hairs; male sep. 2, obovate-oblong, concave, dorsally rounded or almost keeled, glabrous or nearly so, cor.-lobes very minute, disk with black spots, stam. 3–6; fem. fl. sessile or stipitate, sep. 2, cymbiform, acute, dorsally rounded, sometimes with a thickened keel, cor. sessile or stipitate, pet. filiform, very short, terminated by a pencil of long hairs; seeds about $\frac{1}{60}$ in. long, oblong, with papillose ridges, dark red-brown.

Moist region, up to about 4000 ft.; rather rare. Ramboda (Gardner); Ambagamuwa (Thwaites); Kitulgala. Fl. Jan.–March.
Also in Nilgiri Mountains.

9. **E. Brownianum,** *Mart. in Wall. Pl. As. Rar.* iii. 25 (1832).
Thw. Enum. 341. C. P. 377 and 378 (part).
Fl. B. Ind. vi. 576. Wall. Pl. As. Rar. t. 248.

Stem 1–3 in., from a stout copiously rooting rootstock up to 1 in. diam.; l. 6–18 by $\frac{1}{10}$–1 in. broad, narrowly linear to ensiform, acuminate, glabrous or sparsely hairy; scape solitary, 1–2 ft., stout or slender, 7-ribbed and deeply grooved, glabrous or sparsely hairy, and sheaths up to 4 in. long, tip acuminate, green; head $\frac{1}{3}$–$\frac{1}{2}$ in. diam., globose or hemispheric, snow-white, bracts $\frac{1}{4}$–$\frac{1}{3}$ in., as long as the fl., obovate-oblong or cuneiform, spreading, at length reflexed, glabrous, pubescent or villous, pale or dark grey; recept. flat or convex, covered with long straight hairs; outer bracteoles broadly cuneiform, inner spathulate, obtuse, all densely villous above the middle with white hairs; male fl. long-stipitate, stipes hairy, sep. broadly spathulate, free or connate, tips dorsally bearded, cor.-lobes subequal, minute, fimbriate, stam. 6; fem. fl. very shortly stipitate, sep. cymbiform, acute or cuspidate, dorsally hirsute, cor. with ov. shortly stipitate; pet. linear or narrowly oblong, villous with long

straight hairs and with a black spot on the disk; seeds $\frac{1}{30}$ in. diam., oblong or subglobose, ribbed, ribs papillose.

Montane zone, chiefly in higher region; rather common. Adam's Peak (Gardner); Ambagamuwa; N. Eliya; Rangala; Knuckles Mountain; &c. Swampy places in the Central Province, alt. 5500–7200 ft. (Pearson). Fl. March, Sept., Oct.

Also in Khasia and the Nilgiri Mountains.

Very variable, the leaves often much broader than in Wallich's figure.

10. **E. luzulaefolium,** *Mart. in Wall. Pl. As. Rar.* iii. 28 (1832). Fl. Brit. Ind. vi. 582. Schnizl. Icon. t. 46, f. 2, 5.

Perennial (?); stem stout or slender, sometimes as thick as a swan's quill, densely fibrous; l. 1–3 in., broadly subulate, narrowed from the base to the acuminate tip, many-veined, opaque or translucent; scapes many, 3–12 in., slender, 5–7-ribbed, flexuous, sheath obtuse; heads small, hemispheric, $\frac{1}{5}$ in. diam., pale greyish, pubescent, base truncate, intruded; bracts erect or spreading, outer broadly cuneiform, subcoriaceous, shining, glabrous; recept. conical or columnar, villous with long hairs; bracteoles cuneately oblanceolate, obtuse or subacute, dorsally shortly hairy; male fl. stipitate, sep. 3, free or 2-connate, tips ciliate, cor.-lobes minute, obtuse, stam. 6; fem. fl. stipes slender, sep. 3, narrow, concave, dorsally tipped with bristles, cor. with ov. stipitate or subsessile, linear-lanceolate, ciliate; seeds oblong, yellow, faintly ribbed, and most closely transversely ridged, appearing echinulate.

Ceylon (Gardner).

Throughout Continental India. Closely resembles forms of *E. quinquangulare*, from which the seeds distinguish it.

11. **E. truncatum,** *Ham. ex Mart. in Wall. Pl. As. Rar.* iii. 29 (1832).
Thw. Enum. 341 (part). C. P. 793.
Fl. B. Ind. vi. 578.

A tufted annual; l. 1–2½ by $\frac{1}{8}$–$\frac{1}{5}$ in., linear or subulate, acuminate, few or many-veined; scapes many, 1–5 in., rather stout, 5-ribbed, sheath coriaceous, tip green or narrowly membranous; heads $\frac{1}{4}$–$\frac{1}{3}$ in. diam., globose or hemispheric, base truncate, at length intruded; bracts spreading, oblong-cuneiform, shining, glabrous, membranous, pale grey; recept. conical, nearly glabrous; bracteoles incurved, obovoid-spathulate, membranous, glabrous, tip truncately rounded with even margins; male fl. stipitate, sep. 3, all free, or 2-connate cuneately oblong, glabrous; cor.-lobes minute, ciliate, stam. 6 or fewer; fem. fl. long-stipitate, sep. 2–3, narrowly linear,

concave or 1 broader, flat, pet. 3, filiform or narrowly oblanceolate, glabrous or sparsely ciliate, ov. stipitate; seeds oblong, $\frac{1}{100}$ in. long, yellow, strongly ribbed, ribs papillose.

Low country; very common. Swampy places in the Central Province, all 4000–5500 ft. (Pearson).

Thwaites sunk his number 793 under 790.

12. **E. Trimeni,** *Hook, f. n. sp.*

A small, slender annual; l. $\frac{1}{3}$–1 in., narrowly linear or subulate, acuminate, 1-veined above the middle, scapes 1 or few, 1$\frac{1}{2}$–2 in. long, slender, sheath inflated, acuminate; heads $\frac{1}{10}$–$\frac{1}{8}$ in. diam.; bracts erect, obovate-oblong, hyaline, glistening, tips rounded, quite glabrous; recepts. very small, glabrous; bracteoles cuneately oblong or obovate, obtuse, concave, hyaline; fl. all perfectly glabrous, male stipitate, sep. 3, linear-oblong, obtuse, concave, 2 connate; cor.-lobes minute, obtuse, stam. 1; fem. fl. sessile or shortly stipitate, sep. 3, linear, obtuse, concave, cor. and ov. shortly stipitate, pet. narrowly oblanceolate; seeds $\frac{1}{80}$ in. long, oblong-ovoid, acutely 8–10-ribbed, yellow, shining.

Montane zone. Dambulla Rock (*Trimen*). Fl. Dec.

Referred by Dr. Trimen to *E. truncatum*, but a much smaller plant, with perfectly glabrous heads, bracts, bracteoles, and flowers, and shining yellow seeds that are not papillose. It most nearly resembles *E. Sieboldianum*, which differs in the columnar receptacle, form of the bracteoles, absence of pet. in the fem. fl., and smooth seeds.

13. **E. Wightianum,** *Mart. in Wall. Pl. As. Rar.* iii. 28 (1832).
Thw. Enum. 341. C. P. 3382, 378 (part).
Fl. B. Ind. vi. 576.

Stem short or elongate, often as thick as the thumb; l. 6–14 by $\frac{1}{4}$–$\frac{3}{4}$ in., broadly linear or ensiform, obtuse, thin, glabrous or sparsely hairy, many-veined; scapes many, 6–12 in., stout, many-ribbed, and deeply grooved, glabrous or sparsely hairy, sheath with a long green tip; heads $\frac{1}{2}$–$\frac{2}{3}$ in. diam., pale grey and hoary or snow-white from the tip of the fem. pet. projecting beyond the bracteoles; bracts short, broadly obovate-oblong or cuneiform, pale yellowish, pubescent or woolly, coriaceous, tips rounded or truncate; recept. convex, villous with long straight hairs; bracteoles cuneately spathulate, tips cuspidate, scarious, densely hoary or shortly pubescent above and densely villous with long hairs below; male fl. stipitate, stipes hairy at the base, sep. 3, cuneately obovate, 2 often connate, tips pubescent, pet. minute, subequal, stam. 6; fem. fl. sessile or shortly stipitate, sep. 3, linear, concave, all bearded towards the tip, or 1 naked, cor.

shortly stipitate, pet. spathulate or oblanceolate, dorsally villous with very long hairs, disk with a black spot, ov. sessile; seeds globosely oblong or ellipsoid, $\frac{1}{50}$–$\frac{1}{40}$ in. long, dark red-brown, smooth, very minutely papillose.

Montane zone; rather common. Ambagamuwa; Ramboda; N. Eliya; Wattakelle. Fl. Feb.
Also in Burma and S. India.

14. **E. Walkeri,** *Hk. f. in Fl. B. Ind.* vi. 583 (1893).
*E. quinquangulare*, var. *argenteum*, Thw. Enum. 341. C. P. 3562.
Fl. B. Ind. vi. 583.

Annual, densely tufted; l. much shorter than the scapes, narrowly subulate, obtuse, few-veined, opaque, glistening; scapes many, 6–8 in., very slender, 7-ribbed, tip of sheath broadly membranous; head globose, or very shortly oblong, $\frac{1}{6}$–$\frac{1}{4}$ in. diam., snow-white, base at length intruded; bracts much shorter than the head, spreading, scarious, pale, outer obovate-oblong or cuneiform, glabrous, inner oblong, tips bearded; recept. hemispheric to columnar, densely clothed with long white hairs, bracteoles oblanceolate, acute or cuspidately acuminate, membranous, dorsally bearded above the middle or lower with snow-white hairs; male fl. with a short crinite stipes, sep. 3, broadly spathulate, dorsally long bearded, 2 connate, cor.-lobes ovate, subequal, or one longer, all bearded, and with a black gland on the disk, stam. 6; fem. fl. on a short crinite stipes, sep. narrowly obovate or oblong, obtuse, dorsally bearded, cor. sessile or shortly stipitate, pet. oblanceolate, dorsally bearded with long jointed hairs, and tipped with short obtuse white ones, disk of each with a black gland; seeds $\frac{1}{80}$ in. long, oblong or ellipsoid, orange-yellow, smooth, shining, chalaza very large.

Low country; apparently very rare. Kalutara; Batticaloa. Fl. March.
Endemic.

15. **E. quinquangulare,** *L. Sp. Pl.* 87 (1753). **Hin-kokmota,** *S.*
Herm. Mus. 20. Burm. Thes. 109. Fl. Zeyl. n. 48. Moon, Cat. 9. Thw. Enum. 341. C. P. 792.
Fl. B. Ind. vi. 582. Pluk. Phytogr. t. 221, f. 7.

Stems very short, tufted on a short rootstock; l. 1–4 by $\frac{1}{6}$–$\frac{1}{3}$ in., subulate, linear, or ensiform, acuminate, usually narrowed uniformly from base to tip, often bright red-brown when dry; scapes many, 1–4 in., rather stout, flexuous, sheath short, tip membranous, obtuse, or rounded; heads globose, $\frac{1}{6}$–$\frac{1}{4}$ in. diam., grey to snow-white, bracts very short, linear-oblong to broadly oblong or cuneate, scarious, glistening, at length reflexed and concealed under the head; recept.

globose or columnar, sparsely villous, bracteoles oblanceolate or spathulate, acuminate or cuspidate, hyaline, dorsally villous with flexuous hairs; male fl.:—sep. 3, 2 ovate, connate, tips villously penicillate, cor.-lobes minute, stam. 6; fem. fl. stipitate, sep. 3, narrow, 2 concave, dorsally villous, one flat; cor. sessile or stipitate, pet. 3, very unequal, oblanceolate, one much the longest, villous all over, two shorter and much narrower, all usually with a black spot on the disk; seeds very minute, oblong or subglobose, pale yellow, quite smooth, shining.

Low country, in damp places, in both regions, and up to 4000 ft.; very common. Fl. Oct., Feb., July.

Throughout India.

A very pretty little species, with very white heads. Often so abundant as to make the ground look as if covered with snow. The leaves usually pink in colour when dry.

16. **E. collinum,** *Hk. f. in Fl. B. Ind.* vi. 584 (1893).
*E. luzulæfolium*, Thw. Enum. 341 (non Mart.). C. P. 796 (1000).
Fl. B. Ind. vi. 584.

Annual (?); stems densely tufted; l. 1–3½ in. by $\frac{1}{16}$–$\frac{1}{8}$ in., narrowly linear or subulate, obtuse, 1–9-veined, opaque or translucent; scapes many, 3–12 in., slender, rigid, flexuous, 7-ribbed, sheath stout, sometimes as long as the l., tip obtuse, broadly membranous; heads globose, ¼ in. diam., dark grey, base at length intruded; bracts small, outer very short, orbicular or cuneate-obovate, scarious, pale, dorsally hoary, or the outer glabrous, at length reflexed; recept. hemispheric or columnar, densely villous with long hairs; bracteoles cuneately spathulate or obovate, cuspidately acuminate, membranous, dorsally hoary with short white hairs; male fl. stipitate, sep. 3, linear-oblong, concave, cor.-lobes 3, one much the longest, exserted beyond the sep. but not beyond the bracteoles, stam. 6; fem. fl. stipitate, sep. 3, two cymbiform, one flat, cor. sessile or shortly stipitate, pet. narrowly oblanceolate, ciliate, ov. sessile; seeds $\frac{1}{60}$ in. long, oblong, smooth, pale yellow-brown, closely minutely papillose.

Montane zone; rare. Ramboda; Ambagamuwa; Horton Plains. Fl. Dec.–March.

Also in the Nilgiri Mountains.

17. **E. Sieboldianum,** *Sieb. and Zucc. ex Stend. Syn. Pl. Cyp.* 272 (1855).
*E. sexangulare*, Burm. Fl. Zeyl. 31; Moon, Cat. 9; Thw. Enum. 341; Trim. Syst. Cat. 99 (non L.). C. P. 795.
Fl. B. Ind. vi. 577. Burm. Fl. Ind. t. 9, f. 4.

Annual, tufted, stemless; l. 1–2 in., subulate or setaceous, 3–5-veined, glabrous, opaque or translucent, sheath very short,

scapes many, 3–4 in., slender, 5-ribbed, sheath $\frac{1}{2}$ in., obtuse, broadly membranous; heads small, $\frac{1}{5}$ in. diam., globose or ovoid, white or purplish; bracts much shorter than the head, outer broadly oblong, obtuse, tip rounded, inner narrower, all scarious, spreading or ascending, glabrous, pale; recept. small, columnar, glabrous, or sparsely hairy; bracteoles linear-oblong or oblong-lanceolate, obtuse or subacute, closely imbricating, hyaline, glabrous, shining, with usually a broad, often purplish, central band of colour; fl. all glabrous, male and fem. stipitate, male sep. 3, free or connate, obovate-oblong, cor.-lobes minute, stam. 1–6; fem. sep. 1 or 2, filiform or 0, pet. 0, stipes of ov. with a node at the position of the pet.; seeds very minute, about 100 in. long, oblong, quite smooth, pale red- or yellow-brown, shining.

Moist region up to 3000 ft.; common. Fl. Oct., Feb.

Throughout India and in China, Philippines and Japan.

Burman seems to have been the first to refer *E. sexangulare*, L., to this, and so misled subsequent writers.

18. **E. fluviatile,** *Trim. in Journ. Bot.* xxiii. 270 (1885). C. P. 3057.

Fl. B. Ind. vi. 585.

A perennial, submerged aquatic, with emersed heads; stems 2–3 in., very slender, interlaced, flexuous, copiously rooting; l. 8–10 in., about $\frac{1}{24}$ in. broad, almost filiform, concave above, dorsally convex, flaccid, sheath dilated, membranous, 7-veined, base cottony within; scape solitary, rather shorter than the l., slender, 7-ribbed, sheath cylindric, tip with a long green point; head floating, depressed-globose, $\frac{1}{4}$ in. diam.; bracts dark, glabrous, outer orbicular, inner broadly oval or oblong, subscariously coriaceous; recept. hemispheric, glabrous; bracteoles obovate or cuneately oblong, membranous, tips rounded, villous; male fl.:—sep. 3, spathulate, dorsally villous beyond the middle, cor.-lobes rather large, villous, disk with a black spot; fem. fl. subsessile, sep. and subsessile pet. narrow, spathulate, ciliate, the pet. with a black spot; seeds about $\frac{1}{40}$ in., oblong, smooth, pale brown.

In deep running water, in moist low country; very rare. Streams now supplying the great reservoir at Labugama, first noticed by Ferguson in 1882; near Hewesse, Pasdun Korale. Fl. Jan., Feb.

Endemic.

The habit is that of *E. Dalzellii*, but the flowers are very different.

## CXLVIII.—CYPERACEÆ.

PERENNIAL, rarely annual herbs, with the habit of grasses; roots fibrous; stem terete or 3-angled, rarely branched; l. grass-like (rarely 0), 3-ranked, mostly crowded at the base of the stem, upper fewer, with tubular sheaths, which are more or less closed, or the lower split to the base, ligule 0, or a short prolongation of the mouth of the sheath opposite the blade; infl. of solitary, fascicled, panicled, or spicate spikelets, composed of small imbricating distichous, or spirally imbricating scales (glumes); fl. minute, uni- or bisexual, in the axils of the glumes; perianth 0, or of 6 or more hypogynous bristles or scales (ovary enclosed in a utricle in *Carex*); stam. 1–3, fil. flattened, anth. basifixed, linear; ov. 1-celled, style short or long, stigmas 2–3, ovule 1, basal, erect, anatropous; fr. a compressed or trigonous nut; seed erect, free, embryo minute, within the base of the floury endosperm.

In using the following key and the generic characters given of the Ceylon *Cyperaceæ*, it is absolutely necessary, for their proper understanding, to bear in mind that the so-called spikelets of the tribe *Cypereæ* are not homologous with those of the other tribes. In the *Cypereæ*, each flowering glume of the spikelet bears one bisexual fl., and any scales or bristles placed around or below the stamens are considered to be organs of that fl. (disk or perianth). In the other tribes, what appear to be the glumes of a spikelet are considered to be bracts of a spike, each of which bracts bears in its axil a spikelet (homologous with that of *Cypereæ*), reduced to a sessile ovary, accompanied or surrounded with scale-like glumes, which are not arranged upon a rhachilla, but are arranged around the ovary in a certain order, which can only be ascertained by very careful examination. In *Hypolytreæ*, two of the scales are always external to the others, placed right and left of the ov., are monandrous, concave, strongly laterally compressed and keeled, the keel ciliate, the other scales, one or more of which are monandrous, are flat and variously placed. In *Sclerieæ*, where also what appear to be the glumes of a spikelet are considered to be the bracts of a spike, the true spikelet also consisting of scales, like glumes, and the male glumes are usually on a separate spike. There is no trace in *Sclerieæ* of the two right and left glumes of *Hypolytreæ*. Lastly, in *Cariceæ* the true spikelet is represented in the male spike by stamens only, and in the fem. by an ov. enclosed in a utricle, which latter is the homologue of the two right and left scales of *Hypolytreæ*.

From the above it may be concluded that it is very difficult to apply to the infl. of *Cyperaceæ* a nomenclature at once scientific, practical, and intelligible to the student without much circumlocution; I have therefore followed the simplest course of using, throughout the Order, the term spikelet for both spikes and spikelets, and of scales for the glumes of the true spikelets of *Hypolytreæ* and *Sclerieæ*.—J. D. H.

Nut not enclosed in a utricle (see *Lipocarpha*).
 Fl. bisexual, solitary in the glumes of a simple spikelet (*Cypereæ*).
  Glumes all distichous (see also *Actinoschœnus* and some sp. of *Fimbristylis*.
   Rhachilla of spikelet persistent . . . 1. CYPERUS.
   Rhachilla of spikelet disarticulating above the second glume.
    Spikelets many-fld . . . . . . 2. MARISCUS.
    Spikelets few-fld. . . . . . 3. KYLLINGA.
  Glumes all spirally imbricated, or the lower only distichous.
   Spikelets many-fld. (except *Websteria*).
    Hypogynous scales or bristles 0 (see also sp. of *Scirpus* and *Eleocharis*).
     Style-base swollen, disarticulating from the nut.
      Glumes separable from the rhachilla 4. FIMBRISTYLIS.
      Glumes persistent on the rhachilla . 5. ECHINOLYTRUM.
     Style-base persistent on the nut . . 6. BULBOSTYLIS.
    Hypogynous scales or bristles present.
     Nut with hypogynous bristles (0 in some sp. of *Scirpus* and *Eleocharis*).
      Spikelets many-fld.
       Style-base swollen . . . 7. ELEOCHARIS.
       Style-base not swollen . . . 8. SCIRPUS.
      Spikelets 1-fld. . . . . 9. WEBSTERIA.
     Nut with hypogynous scales.
      Scales 3, stipitate, flat . . . 10. FUIRENA.
      Scales 2, hyaline, wrapped round the nut . . . . . . 11. LIPOCARPHA.
   Spikelets few-fld. (see also *Websteria*) (*Rhynchosporeæ*).
    Spikelets compressed, capitate . . 12. ACTINOSCHŒNUS.
    Spikelets not compressed.
     Stigmas 2 . . . . . . . 13. RHYNCHOSPORA.
     Stigmas 3
      Spikelets panicled . . . . 14. CLADIUM.
      Spikelets fastigiate in an ovoid head 15. REMIREA.
 Fl. unisexual; glumes containing many slender scales, some with a single stamen, others empty, and one central naked pistil.
  Spikelets uniform (*Hypolytreæ*).
   Spikelet solitary, unilateral . . . . 16. LEPIRONIA.
   Spikelets many.
    Spikelets in terminal panicles . . . 17. HYPOLYTRUM.
    Spikelets capitate on axillary scapes.
     Nut globose, smooth . . . . 18. MAPANIA.
     Nut deeply 6–10 grooved . . . 19. SCIRPODENDRON.
  Spikelets dimorphic, male narrow, fem. broader (*Scleriеæ*).
   Glumes entire, with one median vein . . 20. SCLERIA.
   Glumes trifid, with 5–7 strong veins . . 21. DIPLACRUM.
Nut enclosed in a compressed utricle . . . 22. CAREX.

## 1. CYPERUS, *L.*

Perennial, rarely annual, glabrous herbs, with a creeping rootstock or 0; l. all towards the base of the stem, with sometimes a few cauline, in a few sp. reduced to sheaths; infl. of solitary or umbelled heads or spikes of spikelets; invol. bracts one or more, foliaceous, with bracteoles under the secondary divisions of the infl.; spikelets linear or oblong, rhachilla persistent, not disarticulating towards the base, with sometimes membranous wings (the persistent bases of the glumes); glumes distichous, 2 lowest empty, the succeeding bisexual, all nearly equal, deciduous in ascending order, uppermost 1–3, empty or sterile; hypogynous scales or bristles 0; stam. 3, rarely 1 or 2, anth. linear or oblong; ov. compressed, style long, short, or 0, stigma 2 or 3, long or short; nut trigonous, triquetrous, or plano-convex.—Sp. about 350; 80 in *Fl. B. Ind.*

A satisfactory classification of the species of *Cyperus* in linear sequence is, owing to their cross affinities, and their variability in habit and in the development of the infl., perhaps unattainable. For this work (in which dichotomy is the rule adopted by Dr. Trimen for the construction of the keys), I have chosen for the principal subdivisions of the genus characters which, though in great measure artificial, will, I think, be serviceable to the student in his endeavour to identify the Ceylon species. This I have followed with an account of the arrangement adopted by Mr. Clarke in the Flora of British India, which is partly natural and partly artificial ;—wholly artificial in retaining *Juncellus* as a genus, and natural in adopting *Pycreus*. With regard to the latter genus, though not adopted by Dr. Trimen in the list of *Cyperaceæ*, which he drew up for description in this work, it is well distinguished from *Cyperus* by the laterally compressed nut, and is, as Mr. Clarke informs me, only distinguishable from *Kyllinga* by habit and the inarticulate rhachilla of the spikelets. For valuable observations on the inflorescence, &c., of *Cyperaceæ*, see that author's Presidential Address to the Linnean Society, published in the "Proceedings" of that body for 1895–6, p. 22.—J. H. D.

Style long, filiform, stigmas 2–3, minute . . . 1. C. CEPHALOTES.
Style very short or 0, stigmas 3, short . . . 2. C. IRIA.
Style long, stigmas 2–3, long.
  Stigmas 2–3, nut dorsally compressed (see also 39, *C. alopecuroides*) . . . 3. C. PYGMÆUS.
  Stigmas 2, nut laterally compressed.
    Spikelets all or most in a solitary terminal head; annuals.
      Rhachilla not winged.
        Spikelets loosely capitate . . . 4. C. STRAMINEUS.
        Spikelets compactly capitate . . . 5. C. PUMILUS.
      Rhachilla winged . . . . . . 6. C. HYALINUS (Vahl).
    Spikelets umbelled.
      Style as long as the nut.
        Nut broadly obovoid . . . . 7. C. SANGUINOLENTUS.
        Nut narrow, truncate . . . . 8. C. POLYSTACHYUS.
      Style shorter than the nut.

Nut obcordate . . . . . . 9. C. PUNCTICULATUS.
Nut broadly obovoid . . . . 10. C. GLOBOSUS.
Stigmas 3.
Spikelets all or most in a single terminal head.
Rhachilla winged . . . . . . 11. C. BULBOSUS.
Rhachilla not, or hardly, winged.
Stem tall . . . . . . . 12. C. CONGLOMERATUS.
Stem short.
Perennial, heads large . . . 13. C. ARENARIUS.
Annual, heads small . . . 14. C. ARISTATUS.
Spikelets in umbelled heads or spikes.
Spikelets in globose compact heads, or digitately or stellately clustered on the rays of a simple or compound umbel. (See also 31 *compressus.*)
Nut long-beaked, margins corky . 15. C. PLATYSTYLIS.
Nut not, or minutely, beaked, margins not corky.
Spikelets in globose compact heads 16. C. DIFFORMIS.
Spikelets digitately or stellately clustered.
Annual, glumes with long recurved cusps.
Nut narrowly oblong, granulate . . . . . 17. C. CASTANEUS.
Nut obovoid, smooth . . 18. C. CUSPIDATUS.
Perennial, except *C. flavidus.*
L. $\frac{1}{8}$ in. broad, or less.
Glumes orbicular.
Spikelets $\frac{1}{5}$–$\frac{1}{3}$ in. long . 19. C. HASPAN.
Spikelets $\frac{1}{10}$–$\frac{1}{6}$ in. long . 20. C. FLAVIDUS.
Glumes oblong . . . 21. C. PULCHERRIMUS.
L. $\frac{1}{3}$–$\frac{1}{2}$ in. broad . . . 22. C. DIFFUSUS.
Spikelets spicate, spikes terminating the rays or raylets of a usually compound umbel.
Spikelets usually long, and loosely spicate.
Bracts 0, or very short; l. 0, or short.
Nut oblong, half as long as the glume . . . . . 23. C. ARTICULATUS.
Nut elliptic, not half as long as the glume . . . . 24. C. CORYMBOSUS.
Bracts leafy, one or more very long.
Nut narrow, half as long as the glume, or more.
L. 1–2, or 0 . . . . 25. C. DEHISCENS.
L. many.
Spikes and spikelets suberect 26. C. DISTANS.
Spikes and spikelets spreading . . . . 27. C. NUTANS.
Nut broad, half as long as the glume, or shorter.

Rhachis of spikes hispidulous 28. C. PILOSUS.
Rhachis of spikes glabrous.
Glumes with a green cusp.
Spikelets $\frac{1}{16}$ in. broad . 29. C. EXALTATUS.
Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. broad.
Spikelets turgid . . 30. C. TUBEROSUS.
Spikelets compressed . 31. C. COMPRESSUS.
Glumes without a green cusp.
Stem tall, triquetrous.
Tip of glumes rounded 32. C. PROCERUS.
Tip of glumes acute or subacute . . 33. C. ZOLLINGERI.
Stem trigonous.
Annual . . . 34. C. ROTUNDUS.
Perennial . . . 35. C. STOLONIFERUS.
Spikelets very short, densely crowded in cylindric spikes.
Styles 3.
Spikes and spikelets spreading.
Spikes 1–1½ in., red-brown . 36. C. DIGITATUS.
Spikes ½–1 in., green . . 37. C. ELEUSINOIDES.
Spikes and spikelets suberect . 38. C. PLATYPHYLLUS.
Styles 2 . . . . . . 39. C. ALOPECUROIDES.

The following is the arrangement followed by Clarke in Fl. B. Ind., with the numbers in brackets as they are arranged in this work :—

Gen. **Pycreus.** Nut laterally compressed, stigmas 2. 1, stramineus (Cyp. 4); 2, sanguinolentus (Cyp. 7); 3, nitens (5. C. pumilus); 4, pumilus (6. C. hyalinus); 5, capillaris (10. C. globosus); 6, polystachyus (Cyp. 8); 7, puncticulatus (Cyp. 9).

Gen. **Juncellus.** Nut plano-convex, dorsally compressed, stigmas 2. 1, alopecuroides (Cyp. 39); 2, pygmæus (Cyp. 3).

Gen. **Cyperus.** Nut trigonous or triquetrous, rarely dorsally compressed, stigmas 3, rarely 2.

Subgen. I. Anosporum. Style entire, or with 3 minute stigmas. 1. C. Cephalotes (1).

Subgen. II. Pycnostachys. Style compressed, stigmas capillary.
Sect. 1. *Natantes.* 2 C. platystylis (15).
Sect. 2. *Amabiles.* Slender annuals, spikelets small, glumes mucronate; 3 castaneus (17); 4, cuspidatus (18).
Sect. 3. *Difformes.* Small, or middle-sized, annuals or biennials, rootstock 0, or creeping in *C. Haspan;* l. and bracts moderately long, narrow, weak; infl. umbellate, rarely capitate; spikelets small, numerous; glumes scarcely cuspidate; 5, difformis (16); 6, pulcherrimus (21); 7, Haspan (19); 8, flavidus (20).
Sect. 4. *Conglomerati.* Rootstock woody, creeping, root-fibres thick, often woolly; infl. umbelled or of one head; 9, arenarius (13); 10, conglomeratus (12); 11, pachyrhizus (12 conglomeratus $\beta$).
Sect. 5. *Diffusi.* Tall, or middle-sized perennials, l. green, somewhat broad, often 3-veined; umbels compound, generally decompound; 12, diffusus (22); 13, pubisquama (12 diffusus $\beta$ pubisquama).

Subgen. III. *Choristachys.* Infl. umbellate, spikes often more or

less corymbed, spikelets sometimes very shortly spicate, stigmas capillary.

A. Rhachilla of spikelets not much winged; l. and bracts long.

Sect. 1. *Compressi.* Annuals or biennials; 14, compressus (31); 15, aristatus (14); 16, Iria (2).

Sect. 2. Rootstock becoming woody, stolons frequent (large or middle-sized); 17, distans (26); 18, nutans (27); 19, eleusinoides (37); 20, pilosus (28); 21, procerus (32).

B. Rhachilla of spikelets usually conspicuously winged.

Sect. 3. *Bulbosi.* Stolons slender, soon disappearing, terminating in tunicated bulbils; 22, bulbosus (11).

Sect. 4. *Brevifoliati.* Tall; stolons long, hardening into creeping rootstocks; l. short, rarely half the length of stem; glumes approximate, closely imbricate; 23, articulatus (23); 24, corymbosus (24).

Sect. 5. *Subimbricati.* Tall; rootstock very short, woody, stolons 0; glumes scarcely imbricating in frt.; 25, C. tegetum, (25 C. dehiscens); 26, Zollingeri (32).

Sect. 6. *Rotundi.* Tall or medium plants, stoloniferous or rootstock woody; l. and bracts long; rhachilla of spikelets winged; glumes closely imbricated; 27, C. rotundus (34); 28, C. stoloniferus (35); 29, C. tuberosus (30).

Sect. 7. *Exaltati.* Tall, stolons 0; l. and bracts long; umbel large, compound, spikes and spikelets many, rhachilla conspicuously winged; anth. apiculate, sometimes crested; style and stigmas small; nut small, ashy black; 30, C. exaltatus (29); 31, C. digitatus (36); 32, C. platyphyllus (38).

1. **C. Cephalotes,** *Vahl, Enum.* ii. 311 (1806).
*C. Hookerianus*, Thw. Enum. 342. C. P. 3221.
Fl. B. Ind. vi. 597. Rheede, Hort. Mal. xii. t. 53.

An annual (?) marsh herb, with slender stolons; stem rather stiff, 6–10 in., trigonous; l. longer or shorter than the stem, narrowly linear, acuminate, striate, erect, $\frac{1}{6}$ in. broad, rather coriaceous, 1-veined; head globose, $\frac{1}{2}$ in. diam., of many small sessile spikelets; bracts 3–4, leaf-like, striate, widely spreading, base a little dilated; spikelets ovate, $\frac{1}{4}$–$\frac{1}{3}$ by $\frac{1}{5}$ in., flat, 20–30-fld., rhachilla stout, not winged; glumes ovate-oblong, cuspidate, cymbiform, closely imbricate, coriaceous, chestnut-brown, many and closely veined, keel suberulous, margin and tip narrowly hyaline; stam. 2–3, fil. broadly linear, anth. linear, $\frac{1}{20}$ in.; nut oblong, narrowed into a subulate beak half as long as itself or more, obscurely trigonous, ventrally concave, dorsally convex, pale and corky in the lower half, brown above it, style jointed on the beak of the nut, capillary, entire or 2–3-toothed.

Moist region, very rare. Galle, Kornagalle, Lunugala, Uva. Fl Sept., &c.

Also in India, Burma, China, Malaya, Australia.

Resembles *Kyllinga monocephala.*

2. **C. Iria,*** *L. Sp. Pl.* 67 (1753). **Wel-hiri,** *S.*
*C. Santonici*, Rottb. Moon, Cat. 6. Thw. Enum. 344. C. P. 811.
Fl. B. Ind. vi. 606. Rottb. l. c. t. 9. f. 1 (*C. Santonici*). Rheede, Hort. Mal. xii. t. 56.

A glabrous tufted annual; stem 4–20 in., triquetrous; l. as long as the stem or shorter, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, finely acuminate flaccid, 1-veined; umbel decompound, of many primary rays 1–5 in. long, bearing irregularly fascicled secondary umbels formed of narrow interrupted spikes of 5–20 small few-fld. spikelets; spikelets $\frac{1}{10}$–$\frac{1}{5}$ by $\frac{1}{16}$ in., linear-oblong, obtuse, greenish-brown, rhachilla very slender, not winged; glumes loosely imbricate, orbicular-obovate, hyaline, 3–5-veined, keeled toward the rounded or retuse apiculate tip, dorsally mottled with brown, 2 lowest much smaller, ovate, acuminate, empty; stam. 2 or 3, fil. often connate below, anth. very minute, oblong, tip conical; nut obovoid, trigonous, about as long as the glume, black, style very short or 0, stigmas 3, much shorter than the nut, linear.

In paddy fields and other wet places, very common. Fl. all the year.
Tropics of old world.

3. **C. pygmæus,** *Rottb. Descr. et Ic.* 20 (1773).
Moon, Cat. 6. Trim. Syst. Cat. 99. C. P. 3947.
Fl. B. Ind. vi. 596 (*Juncellus*). Rottb. l. c. t. 14, ff. 4, 5.

Annual, dwarf, densely tufted; stems 1–10 in., erect or spreading; l. as long as the stem, or shorter, narrow, acuminate, flaccid; spikelets innumerable, sessile, densely packed in an entire or lobed terminal head $\frac{1}{4}$–$\frac{2}{3}$ in. diam., ovate, $\frac{1}{10}$ in. long, 8–20-fld., greenish, often curved or twisted, at length brown, rhachilla very slender, not winged; bracts 2–4, 1–6 in. long, flaccid, base broadly dilated; glumes closely imbricate, ovate- or oblong-lanceolate, narrowed into a long straight or recurved green cusp, 5–7-veined, keel not prominent; stam. 1, rarely 2, anth. linear-oblong, muticous; nut $\frac{2}{5}$ as long as the glume, stipitate, narrowly linear-oblong or oblong-lanceolate, plano-convex, trigonous or terete, acute, style shorter than the nut, stigmas 2, rarely 3.

Low country, rather rare. Colombo (Ferguson); Puttalam; Anuradhapura. Fl. all the year.
All warm countries.
Very difficult to distinguish from the Oriental *Scirpus Michelianus*, L., and by many botanists the two are united. According to Clarke (Fl. B. Ind. l. c.), it may be distinguished by the scars of the rhachilla being distichous, and not spirally arranged.

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* *Ira* is Rheede's name in Hort. Mal. xii. 105.

4. **C. stramineus,** *Nees in Wight, Contrib.* 74 (1834).
Thw. Enum. 432. C. P. 3776.
Fl. B. Ind. vi. 589 (*Pycreus*).

Annual, stems densely tufted, 6–12 in. high, very slender, base thickened; l. suberect, as long as the stem or shorter, very narrow, $\frac{1}{20}$ in. broad, acuminate, 1-veined, sheath short; infl. a loose head of 5–20 suberect, sessile or subspicate spikelets; bracts 2–3, filiform, erect or spreading, longest 2–3 in.; spikelets linear, pale, $\frac{1}{4}$–$\frac{2}{3}$ by $\frac{1}{10}$ in., 15–70 fld., rhachilla stout, tetragonous, angles membranous, hardly winged, at length deeply pitted with square lacunæ; glumes closely imbricate, broadly triangular-ovate, obtuse or cuspidate, turgid, dorsally rounded and 3–5-veined, hardly keeled, sides veinless; anth. narrowly linear, muticous; nut $\frac{1}{2}$ as long as the glume, suborbicular, laterally somewhat compressed, turgidly biconvex, dark brown, granular, surface cells oblong, style much longer than the nut, stigmas 2, capillary.

Low country; very rare. Kurunegala. Fl. Sept.
Also in India and Burma.
Roots described as being aromatic.

5. **C. pumilus,** *L. Sp. Pl.* ed. 2 (1762). **Go-hiri,** *S.*
Moon, Cat. 6. *C. pulvinatus*, Nees et Mey.; Thw. Enum. 342. C. P. 806.
Fl. B. Ind. vi. 591 (*Pycreus nitens*). Pluk. Phyt. t. 191, f. 8. Gaertn. Fruct. t. 2, f. 2.

Annual, dwarf; stems densely tufted, 1–6 in. capillary; l. longer and shorter than the stem, very slender $\frac{1}{20}$ in. broad, 1-veined, flaccid, sheath short; head of spikelets globose, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., entire or lobed, sometimes broken up into peduncled spikes or clusters of spikelets or into rays of an umbel; bracts 3–4, leaf-like, up to 4 in. long, base not dilated; spikelets linear or linear-oblong, $\frac{1}{6}$–$\frac{1}{3}$ by $\frac{1}{6}$ in., 20–50-fld., pale or dusky straw-col'd., rhachilla stout, tetragonous, not winged; glumes rather loosely imbricate, broadly ovate, cymbiform, spreading, strongly cuspidate below the bifid tip, dorsally rounded and 3-veined, green, sides hyaline, veinless; stam. 1, rarely 2, anth. small; nut small, not half the length of the glume, substipitate, broadly obovoid, laterally compressed, biconvex, apiculate, granulate, dark brown, style much longer than the nut, stigmas 2, capillary.

Low country in wet sandy places; common. Fl. Dec., &c.
India, and all hot countries of the Old World.

6. **C. hyalinus,** *Vahl, Enum.* ii. 329 (1806).
*C. pumilus*, Nees; Thw. Enum. 432. Trim. Syst. Cat. 99. C. P. 3787.
Fl. B. Ind. vi. 591 (*Pycreus pumilus*) (not given for Ceylon).

Annual, dwarf, leafy, stems tufted, 1–4 in.; capillary; l. as long as the stem or longer, narrowly linear, acuminate, $\frac{1}{5}$ in. broad, flat, flaccid, 1-veined; sheath short; head of sessile or very shortly spicate clusters of sessile rather broad few-fld. spikelets, or of a few short rays with 3–6 distichous spikelets; bracts 3–4, up to 3 in. long, leaf-like; spikelets ovate-oblong, $\frac{1}{6}$–$\frac{1}{4}$ by $\frac{1}{10}$ in., 6–10 fld. yellow-green strongly compressed, rhachilla stout, wings lanceolate; glumes loosely imbricate, spreading, ovate, long and stoutly cuspidate below the obtuse tip, sides broadly hyaline with two strong veins, keel 3-veined; stam. 3, anth. linear, muticous; nut large, $\frac{2}{3}$ as long as the glume, broadly obovate-oblong, truncate or retuse, laterally flattened, style shorter than the nut, stigmas 2, long, capillary.

Low country in the dry region; rather rare. Kurunegala District (Thwaites); Anuradhapura, abundant; Tissamaharama. Fl. Dec.
Also in S. India and Timor.

7. **C. sanguinolentus,** *Vahl, Enum.* ii. 351 (1806). Thw. Enum. 342. *C. Eragrostis*, Vahl; Trim. Syst. Cat. 99. C. P. 802.
Fl. B. Ind. vi. 590 (*Pycreus*). Rottb. l. c. t. ix. f. 4 (*C. pumilus*).

Rootstock creeping, as thick as a crow-quill; stem 4–20 in., rather stout, soft, trigonous above, sometimes leafless; l. few, many or 0, as long as the stem or shorter, $\frac{1}{10}$–$\frac{1}{5}$ in. broad, acuminate, 1-veined; umbel small, simple, rays 2–5, stout, terminated by very short spikes of 3–6 spreading spikelets, sometimes the infl. is contracted into a single head; bracts 3–5, up to 5 in. long, foliaceous; spikelets $\frac{1}{4}$–$\frac{1}{3}$ by $\frac{1}{8}$ in., shortly spicate, flat, linear or oblong, 6–24 fld., red-brown, rhachilla rather stout, not winged; glumes loosely imbricate, orbicular, tip rounded, dorsally convex, not keeled, 3-veined, margins broadly hyaline, mottled with brown; anth. linear, muticous; nut broadly obovoid about half as long as the glume, laterally compressed, turgidly biconvex, ashy brown, style as long as the nut, stigmas 2, capillary.

Moist low country; rather common; frequent at Peradeniya. Fl. Oct.
India and all other hot countries of the Old World.

8. **C. polystachyus,** *Rottb. Descr. et Ic.* 39 (1773).
Thw. Enum. 342. C. P. 800.
Fl. B. Ind. vi. 592 (*Pycreus*). Rottb. l. c. t. 11, f. 1.

Perennial, tufted; stems slender, 12–30 in.; trigonous, thickened at the base; l. shorter than the stem, $\frac{1}{8}$ in. broad, flaccid, sheath short; umbel simple, of 2–7 slender rays $\frac{1}{2}$–2 in. long, each terminated by short ternate spikes of 4–8 narrow spikelets; bracts 3–6, spreading, up to 6 in. long, foliaceous; spikelets close together, $\frac{1}{2}$–$\frac{2}{3}$ in. by $\frac{1}{15}$ in. broad, linear,

acuminate, flat, red-brown, 20–50-fld., rhachilla rather stout naked or narrowly winged; glumes closely imbricate, subovate, oblong, obtuse with a mucro, thin, obscurely 3-veined, sides yellow streaked with brown, margins very narrowly hyaline; stam. usually 2, anth. small, oblong; nut half as long as the glume, narrowly oblong or obovate-oblong, apiculate, laterally compressed, biconvex, black, granulate, style as long as the nut, stigmas 2, rarely 3, capillary.

Low country; very common. On the patanas of the Central Province, alt. 5600 ft. (Pearson). Fl. March, &c.

In all hot countries. One form has usually the spikelets lax and open, and is var. *laxiflorus*, Benth.

9. **C. puncticulatus,** *Vahl, Enum.* ii. 348 (1806).
Thw. Enum. 342. C. P. 3751 and 4018.
Fl. B. Ind. vi. 593 (*Pycreus*).

Annual; stem robust, subsolitary, 1–2 ft., erect from a thickened base, trigonous or triquetrous above, angles smooth; l. as long as the stem or shorter, $\frac{1}{6}$–$\frac{1}{2}$ in. broad, rather thick, 1-veined, pale beneath, margin smooth, sheath long; umbel simple or compound, rays many, very slender, up to 6 in. long, terminated by few or many slender spikes of widely spreading pale or dark red-brown spikelets; bracts 3–4, foliaceous, longest 6 in. or more; spikelets distant on the slender rhachis, $\frac{1}{4}$–2 in. long, by $\frac{1}{7}$ in. broad, linear or linear-oblong, compressed, soft, many-fld.; rhachilla slender, angular, undulate, hardly winged; glumes closely imbricate, thin, orbicular, cymbiform, tip rounded and margins broadly hyaline, dorsally 5-veined, mottled with brown, sides pale; stam. 3, anth. nearly as long as the glume, narrow, muticous; nut $\frac{2}{3}$ as long as the glume, obcordate, strongly laterally compressed, granulate, pale or dark brown, style shorter than the nut, stigmas 2, capillary.

Low country; rather rare. Trincomalie; Seven Korales; Kurunegala. Fl. Mar., July. Sept.

Also in Peninsular India and China.

C. P. 4018 has much smaller umbels, with short rays and small crowded spikes of pale oblong spikelets nearly $\frac{3}{10}$ in. long.

10. **C. globosus,** *Allioni, Fl. Pedem.* i. 49 (1785).
*C. flavescens*, Thw. Enum. 342 (non L.); Trim. Syst. Cat. 99. C. P. 801.
Fl. B. Ind. vi. 591 (*Pycreus capillaris*).

Rootstock small, roots fibrous, stems tufted, 4–24 in., very slender, trigonous, l. 4–12 by $\frac{1}{6}$ in., very slender, almost filiform, $\frac{1}{10}$ in. broad; umbel simple, or spikes capitate, rays 3–5, 1–1$\frac{1}{2}$ in. long, very slender, terminated by solitary or few spikes of 5 or more short spreading spikelets; bracts 2–3, foliaceous, 1 or 2 longer than the infl.; spikelets crowded,

$\frac{1}{2}$–$\frac{4}{5}$ by $\frac{1}{12}$–$\frac{1}{10}$ in., narrowly linear, much compressed, 20–50-fld., dark red-brown; rachilla rather stout, tetragonous, not winged, spotted with red; glumes erecto-patent, closely imbricate, ovate, obtuse, rather coriaceous, faintly 3-veined, keel green, sides brown, margins hardly hyaline; stam. 2; nut small, $\frac{1}{3}$ as long as the glume, broadly or narrowly obovoid, tip rounded and beaked, laterally compressed, biconvex, dark chestnut, style shorter than the nut, stigmas 2, capillary.

Moist region, extending up to over 6000 ft.; very common. Fl. Oct., Nov., &c.

Throughout the temperate and hot countries of Old World.

A very variable plant. The common Ceylon form is *C. nilagiricus*, Hochst. in Steud., distinguished by Clarke (in Fl. B. Ind.) by narrower spikelets. Nuwara Eliya specimens have broader spikelets and smooth nuts. A Kurunegala specimen has short pale green spikelets. In Mt. Lavunia ones, growing in shade, the stems are filiform, bearing solitary heads of 5–8 spikelets.—J. D. H.

11. **C. bulbosus,** *Vahl, Enum. Pl.* ii. 342 (1806). **Chilanti arichi,** *T.* [PLATE XCVI.].

*C. jeminicus*, Retz. Obs. Bot. iv. 11; Clarke in Journ. Linn. Soc. xxi. 175 (non Rottb.). *C. geminatus*, Moon, Cat. 6 (non Schrad.), Wight, Contrib. 80. *C. hexastachyus*, var. *β*, *pendulus*, Wight, Contrib. 82 (non Rottb.). *C. rotundus*, Kunth; Thw. Enum. 343 (part). Trimen in Journ. Bot. xxii. 358; Syst. Cat. Ceyl. Pl. 109.

Fl. B. Ind. vi. 611. Clarke in Journ. Bot. xxviii. 19 (bulbils).

Stem 4–10 in., slender, trigonous, base stoloniferous, clothed with black coriaceous scales, stolons $\frac{1}{2}$–$2\frac{1}{2}$ in. long, filiform, bearing conico-ovoid bulbils coated with a thick black coriaceous at length bipartite integument; l. many, fascicled towards the middle of the stem, and longer than it, spreading and recurved, up to $\frac{1}{10}$ in. broad, 1-veined, tip filiform, elongate, sheath very long, membranous, white; head of umbels about 1 in. diam., formed of slender alternate peduncled spikes, each bearing 3–20 spikelets, the lower distant from the upper; bracts 3, alternate, longer than the infl., very unequal, filiform, strict, longest 3–4 in.; spikelets $\frac{1}{3}$–$\frac{2}{3}$ by $\frac{1}{20}$ in., shortly pedicelled, linear, acute, 8–26-fld., chestnut-brown; rhachilla with persistent elliptic wings; glumes $\frac{1}{10}$ in., oblong, obtuse, cymbiform, membranous, dorsally rounded, 7–11-veined; stam. 3, anth. very long ($\frac{1}{20}$ in.), linear, muticous; nut (not seen in Ceylon specimen), not half as long as the glume, obovoid, obtuse, triquetrous, black, style shorter than the nut, stigmas 3, rather long, capillary.

Sandy sea-coast in the dry region. Jaffna, Mannar, Chilaw, &c. Fl. Nov., Dec.

Dry and desert districts of Tropics of Old World.

Very unlike in habit to the other Sinhalese species.

12. **C. conglomeratus,** *Rottb., Descr. et Ic.* 21 (1773).
Thw. Enum. 343. C. P. 808.
Fl. B. Ind. vi. 602. Rottb. l. c. t. 15. f. 7.

Rootstock short or long, woody, creeping, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., roots of stout woolly fibres; stems 18–24 in., stout, terete below, trigonous above, base thickened and clothed with dark chestnut-brown ovate acuminate scales; l. as long as the stem or shorter, $\frac{1}{8}$–$\frac{1}{6}$ in. broad, coriaceous, margins involute when dry, dorsally rounded, not keeled, veins obscure; heads globose, 1–1$\frac{1}{2}$ in. diam., of densely crowded spreading spikelets; bracts 3–4, very long, spreading and deflexed, narrower than the l., longest up to 10 in.; spikelets ovate-oblong, $\frac{1}{2}$ by $\frac{1}{5}$ in. long, 10–20-fld., rhachilla stout, scarred, not winged; glumes broadly ovate or oblong-ovate, cymbiform, cuspidate below the obtuse erose tip; dorsally rounded, not keeled, many-veined, sides hyaline, veinless; stam. 3, anth. very long, narrow, muticous; nut $\frac{1}{3}$ the length of the glume, broadly obovoid, compressed, obscurely trigonous, dark brown, style shorter than the nut, stigmas 3, capillary.

Var. β, **pachyrhizus,** *Trim. MSS.*
*C. pachyrhizus*, Nees ex Boeck. in Linnæa, xxxv. 545. Trim. Cat. 200. Fl. B. Ind. vii. 603.

More slender, l. narrower, head 2 in. diam., rays $\frac{1}{4}$ in., spikelets smaller and narrower, about $\frac{1}{10}$ by $\frac{1}{12}$ in., glumes muticous.

Sandy sea-coast, in dry region; very rare. Aripo (Gardner). Var. β, Kalpitiya on W. Coast. Fl. March, Aug.
Also in N. Africa, Arabia, and Sind, and Var. β in Laccadive Is.

*C. jeminicus*, Rottb. (non Retz.) is referred to this by Clarke in Fl. B. Ind., who also refers the plant of Thw. Enum. to *C. pachyrhizus*, and I have done so in Syst. Cat. 100; but it seems closer to the type.—*Trimen.*

13. **C. arenarius,** *Retz. Obs. Bot.* iv. 9 (1786). **Mudu-kalan-duru,** *S.*
Moon, Cat. 6. Thw. Enum. 342. C. P. 798.
Fl. B. Ind. vi. 602. Plukenet, Phytogr. t. 300, f. 7.

Rootstock elongate, striate, rigid, creeping, dichotomously branched, sheathed at the nodes with chestnut scales an inch long, roots fibrous, filiform, glabrous; stem solitary, 4–22 in., rather stout, rigid, terete, clothed below with long withered sheaths; l. longer or shorter than the stem, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, spreading and recurved, rigidly coriaceous, terete and grooved above, or broader with complicate sides, veinless, not keeled; head globose, $\frac{1}{2}$–1$\frac{1}{2}$ in. diam., of many sessile radiating spikelets; bracts 2–3, foliaceous, rigid, lowest 2–4 in., simulating a continuation of the stem; spikelets $\frac{1}{3}$–$\frac{1}{2}$ by $\frac{1}{6}$ in., linear-oblong, 8–16-fld., straw-col'd., finally brown, rachilla

stout, not winged; glumes broadly ovate, cymbiform, obtuse, minutely cuspidate, dorsally rounded, streaked with brown, strongly many-veined up to the hyaline margin; stam. 3, anth. narrowly linear, muticous; nut $\frac{1}{3}$ the length of the glume, obovoid, obtuse, dorsally compressed, trigonous, concavo-convex, tipped by the hardened base of the style, dusky-black, style shorter than the nut, stigmas 3, long, capillary.

Sandy seashore all round the island. Fl. all the year.
Also in India, Persia, and Arabia.

*Bobartia indica*, L. Sp. 54 (Fl. Zeyl. n. 41), is erroneously referred by Lamarck (Ill. i. t. 40) to *Cyperus*, and he is followed by Bentham (Gen. Pl. iii. 698, 1015) and Clarke (Journ. Linn. Soc. xxi. 111, and in Fl. B. Ind.). Schumacher, however, long ago (Act. Soc. Nat. Sc. Hafn. iii. 8) showed that Hermann's specimens were *Moræa spathacea*, Willd., and from the Cape, not from Ceylon, and I have corroborated his identification in Journ. Linn. Soc. xxiv. 135.—*Trimen.*

14. **C. aristatus,** *Rottb. Descr. et Ic.* 23 (1773).
Thw. Enum. 343. C. P. 966.
Fl. B. Ind. vi. 606. Rottb. l. c. t. 6, f. 1.

A small, glabrous, tufted annual, 3–6 in. high; stems tufted, stout or slender, trigonous; l. usually shorter than the stem, erect, very slender, $\frac{1}{40}$–$\frac{1}{10}$ in. broad, acuminate, flat or filiform, flaccid, 1-veined, sheath membranous; heads solitary or 2–3, globose or oblong, up to $\frac{1}{2}$ in. long or broad, simple or lobed, sessile or peduncled, of densely packed squarrose spikelets sessile on a stout rhachis; bracts 3 or 4, 1 or 2 longer than the infl.; spikelets minute, $\frac{1}{12}$–$\frac{1}{5}$ in., oblong or linear, 6–10-fld., rhachilla not winged; glumes oblong, tapering to a recurved beak as long as the limb, 7–11-veined up to near the margin, pale or dark brown, keel strong, ending in a mucro; stam. 1, anth. small, oblong; nut $\frac{1}{3}$ the length of the glume, oblong or narrowly obovoid, trigonous, pale brown, style shorter than the nut, stigmas 3, capillary.

In damp sandy places, especially in the dry region; common. Fl. Dec.–March.
Throughout the Tropics.

15. **C. platystylis,** *Br. Prod.* 214 (1810).
*C. pallidus*, Heyne, Thw. Enum. 343. C. P. 3559.
Fl. B. Ind. vi. 598.

A tall, stout, marsh or water herb; stem 2–3 ft., as thick as the little finger at the base, triquetrous above, angles smooth or scaberulous, root-fibres very stout; l. as long as the stem or shorter, up to $\frac{1}{2}$ in. broad, coriaceous, closely striate, midrib slender, margins and keel scabrid, sheath acutely keeled; umbel short, broad, hemispheric, up to 10 in. diam.;

rays 10–30, superposed, slender, spreading, terminated by 6–8 short spreading secondary rays, each bearing 3–5 spreading spikelets; bracts 8–18 in., very unequal, longest up to 2 ft. by $\frac{2}{3}$ in. broad, margins and keel scabrid; spikelets $\frac{1}{3}$–$\frac{1}{2}$ by $\frac{1}{10}$–$\frac{1}{8}$ in., linear-lanceolate, acute, rather tumid, few or many-fld., chestnut-brown, rhachilla scarcely winged, persistent; glumes closely imbricate, broadly ovate, cymbiform, tip rounded strongly cuspidate, or lower muticous, dorsally rounded except towards the tip, faintly 3-veined, sides veinless; stam. 3, fil. broadly linear, anth. small, linear, tipped with short hairs; nut $\frac{2}{3}$ the length of the glume or longer, ellipsoid, beaked, unequally trigonous, base and sides broadly corky, straw-col'd.; style shorter than the nut, flattened, papillose, stigmas 3, short, revolute.

Wet places in the low country; rare. Batticaloa; Kurunegala; Colombo Lake. Fl. March, Sept.

Also in Bengal, Burma, Malaya, Australia.

Erroneously described in Fl. B. Ind. as having long stolons, and as having anth. crested with a linear lanceolate red mucro. The style is that of a *Fimbristylis.*

16. **C. difformis,** *Linn. Cent. Plant.* ii. 6 (1755).
Trim. Syst. Cat. 344. C. P. 3042.
Fl. B. Ind. vi. 599. Rottb. Descr. et Ic. t. 9, f. 2.

A glabrous annual; stems 4–20 in., tufted, weak, triquetrous towards the top; l. few, as long as the stem or shorter, $\frac{1}{8}$–$\frac{1}{6}$ in broad, sometimes all reduced to sheaths with a short limb, linear, acuminate, flaccid, veins faint, sheath of upper long; umbel simple, of 4–6 slender rays $\frac{1}{6}$–$\frac{1}{2}$ in. long, terminated by globose heads of minute spikes, rarely rays short and heads all clustered, heads $\frac{1}{5}$–$\frac{1}{3}$ in. diam., ebracteolate, green, sometimes lobed; bracts 3, 2–10 in., lowest often suberect, flaccid; spikelets minute, most densely crowded, $\frac{1}{6}$–$\frac{1}{20}$ in. long, rather turgid, 10–30 fld., rhachilla not winged; glumes closely imbricate, almost orbicular, obtuse or apiculate, dorsally rounded and 3-veined, sides broadly membranous; stam. 1–2, anth. small, oblong, muticous; nut very minute, nearly as long as the glume, suborbicular, apiculate, obtusely trigonous, pale or yellowish-brown, style much shorter than the nut, stigmas 3, short, capillary.

Wet places; common. Fl. March.

Throughout the warm regions of the Old World.

17. **C. castaneus,** *Willd. Sp. Pl.* i. 278 (1797).
Thw. Enum. 343. C. P. 803 (part).
Fl. B. Ind. vi. 598 (excl. syn. *C. squarrosus*).

A very slender, tufted annual; stems 1–6 in., almost filiform; l. as long as the stem or shorter, from almost filiform

to $\frac{1}{12}$ in. broad; umbel simple, consisting of a terminal head and few or many unequal filiform spreading rays $\frac{1}{4}$–$1\frac{1}{2}$ in. long, terminated by heads of 3–20 stellately spreading spikelets; bracts 3 or 4, setaceous, flexuous, spreading, one or more longer than the rays; spikelets $\frac{1}{3}$–1 in. by $\frac{1}{20}$–$\frac{1}{16}$ in., very unequal, linear, compressed, pale or dark chestnut, 15 or more-fld.; rhachilla slender, very narrowly winged; glumes broadly oblong, 3-veined, strongly keeled, keel produced beyond the rounded hyaline tip into a stout, green, recurved cusp half as long as the limb; stam. 1–2, anth. short; nut about half as long as the glume, linear-oblong, obtusely trigonous, minutely granulate, very dark red, style much shorter than the nut, stigmas 3, filiform.

Gravelly places in the low country; rather common. Peradeniya; Bibile. Fl. Jan.

Also in India, Cochin China, Australia.

The quotation of *C. squarrosus*, Trim. Cat., in Fl. B. Ind., is an error; a specimen of *Mariscus squarrosus*, Clarke, was taken for it, these two plants being remarkably alike.

18. **C. cuspidatus,** *H. B. and K. Nov. Gen. and Sp.* i. 204 (1815). Trim. Syst. Cat. Ceyl. Pl. 100. Clarke, l. c. 90. C. P. 803 (part). Fl. B. Ind. vi. 598.

A very slender, tufted annual; stems 2–4 in. erect; l. shorter or longer than the stem, filiform, flexuous; umbel simple, of a terminal head, and few or many filiform, spreading, unequal rays $\frac{1}{4}$–1 in., each terminated by a head of stellately spreading spikelets; bracts 3–5, filiform flexuous, much longer than the rays; spikelets 5–12 in a cluster, $\frac{1}{5}$–$\frac{3}{5}$ by $\frac{1}{16}$ in., linear, spreading, 12–20-fld., pale green to red-brown; rhachilla slender, very narrowly winged; glumes hyaline, broadly oblong, 3-veined, strongly keeled, keel produced from below the apex into a recurved green cusp as long as limb, sides streaked with brown; stam. 1–2, anth. very shortly oblong; nut not half as long as the glume, obovoid, trigonous, smooth, dark brown, style shorter than the nut, stigmas 3, capillary.

Wet sandy ground in low country; common. Fl. (?).

In all hot countries.

Thwaites did not distinguish this from *C. castaneus*. There are only two specimens in Herb. Peraden., without locality or date, and no Ceylon ones in Herb. Kew.

19. **C. Haspan,*** *L. Sp. Pl.* 45 (1753). **Halpan,** *S.* Herm. Mus. 23. Burm. Thes. 108. Fl. Zeyl. n. 37. Thw. Enum. 343. C. P. 799, 965. Fl. B. Ind. vi. 600. Rottb. Descr. et Ic. t. 6, f. 2, and t. 17, f. 3 (*Scirpus autumnalis*).

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* A misprint for 'Halpan,' Hermann's S. name for this; Linnæus copied from Burmann. (See also *Fimbristylis globulosa*, p. 57.)

Perennial; rootstock creeping, covered with ovate triangular scales, giving off solitary or tufted, stout or slender trigonous or triquetrous, often compressed stems 6–24 in. high; l. shorter than the stem, $\frac{1}{10}$ in. broad, biconvex, acute, erect, sometimes very short and subulate; umbel simple or compound, of 4–12 slender spreading very unequal rays up to 3 in. long, secondary rays bearing 6–60 or more slender stellately spreading spikelets; bracts 2–3, very variable. narrow and much shorter than the rays, or broader than the l. and 3 in. long; spikelets linear, acute, $\frac{1}{5}$–$\frac{1}{3}$ by about $\frac{1}{20}$ in., flat, 10–40-fld., pale or chestnut-brown, rhachilla narrow, winged; glumes closely or loosely imbricate, ovate, obtuse or mucronate by the excurrent midrib, dorsally rounded, obscurely veined; stam. 2–3, anth. linear-oblong, tip minutely bristly; nut minute, $\frac{1}{3}$ the length of the glume, on a globose stipes, globosely obovoid, trigonous, smooth or scaberulous, pale brown (imperfect white globose nuts occur), style longer than the nut, stigmas 3, capillary.

Wet places, especially paddy fields; very common. Fl. Dec.–April, &c.

All hot countries.

C. P. 965 is a very tall form, with compound umbels and large spikelets. This species and *C. flavidus* are remarkable for the globose stipes of the nut.

20. **C. flavidus,** *Retz. Obs.* v. 13 (1789).
Trim. Syst. Cat. Ceyl. Pl. 100. C. P. 805.
Fl. B. Ind. vi. 600. Rottb. Ic. t. 6, f. 2 (*C. Haspan*).

Annual; stems tufted, 6–18 in., stout or slender, trigonous, soft; l. shorter than the stem, erect, narrowly linear, $\frac{1}{12}$–$\frac{1}{2}$ in. broad, flat, 1-veined; umbel compound or decompound, rays many, spreading, primary 1–3 in., secondary $\frac{1}{2}$–1 in., bearing heads of stellately spreading minute spikelets; bracts 2–3, one or two up to 6 in. long, bracteoles 0; spikelets $\frac{1}{10}$–$\frac{1}{6}$ by $\frac{1}{30}$ in., lanceolate, 8–30-fld., greenish-brown, rhachilla stout, not winged; glumes loosely imbricate, orbicular, hyaline with a broad, green, triangular, obscurely 3-veined central area; stam. 1, rarely 2, anth. linear, muticous; nut minute, not $\frac{1}{3}$ the length of the glume, shortly stoutly stipitate, globosely obovoid, trigonous, white or marbled with white, style as long as the nut, stigmas 3, capillary.

In paddy fields, &c., in the low country; very common.
Throughout warm regions of the Old World.
Not distinguished from *C. Haspan* by Thwaites.

21. **C. pulcherrimus,** *Willd. in Kunth, Enum.* ii. 35 (1837).
*C. silletensis*, Thw. Enum. 343 (non Nees). C. P. 3558.
Fl. B. Ind. vi. 600.

Perennial; rootstock short, creeping, root-fibres slender; stem 12–18 in., rather slender, trigonous; l. as long as the stem or longer, narrowly linear, $\frac{1}{10}$–$\frac{1}{5}$ in. broad, flaccid, 1-veined; umbel compound, contracted, rays very many, bearing crowded umbellules, whose subglobose heads of innumerable spikelets conceal the secondary rays; bracts 3–5, foliaceous, longest up to 6 in.; spikelets $\frac{1}{15}$–$\frac{1}{5}$ by $\frac{1}{40}$ in., densely crowded, oblong-lanceolate, 12–20-fld.; rhachilla rather stout, not winged; glumes loosely imbricate, ovate-oblong, obtuse, incurved (from base to tip), hyaline with 2 broad red-brown bands; stam. 1–2, anth. linear; nut minute, half as long as the glume, shortly stoutly stipitate, globosely trigonous, acute at both ends, granulate, style nearly as long as the nut, stigmas 3, capillary.

Dry country in wet places; very rare. Batticaloa. Fl. March. Also in Bengal, Assam, Malaya.

22. **C. diffusus,** *Vahl, Enum.* ii. 321 (1806).
*C. nigro-viridis,* Thw. Enum. 344. *C. elegans,* Clarke, in Journ. Linn. Soc. xxi. 125; Trim. Syst. Cat. Ceyl. Pl. 100 (non L.). C. P. 2879.
Fl. B. Ind. vi. 603.

Perennial; rootstock short, root-fibres strong, wiry; stems 1–2½ ft., rather slender, trigonous; l. very many, all subradical, nearly as long as the stem, linear, $\frac{1}{3}$–$\frac{2}{3}$ in. broad, acuminate, flat, membranous, flaccid, 3-veined, tip setaceous, margins scaberulous, sheath short; umbel decompound, short, broad, 4–8 in. diam., rays many, up to 3 in. long, slender, secondary filiform, bearing 2–4 short sessile spreading spikelets; bracts 4–10, one or more up to 2 ft. long, bracteoles very short, ovate, acuminate or setaceous; spikelets $\frac{1}{3}$–$\frac{2}{3}$ by $\frac{1}{10}$ in., linear-oblong, acute, 8–20-fld., rhachilla stout, with narrow persistent wings; glumes loosely imbricate, orbicular, stoutly cuspidate, dorsally very strongly 3–5-veined, veins meeting in the green cusp. margins broadly hyaline, streaked and dotted with red-brown; stam. 2–3, anth. small, tipped with a subulate appendage; nut nearly as long as the glume, broadly ellipsoid or obovoid, acute, trigonous, dark brown, faces concave, minutely granulate, style very short, stigmas 3, very long, capillary.

Var. **pubisquama,** *C. pubisquama,* Steud. in Zoll. Verz. Ind. Arch. ii. 62 (1854).
Fl. B. Ind. vi. 604. *C. diffusus,* Clarke in Journ. Linn. Soc. xxi. 127. Trim. Syst. Cat. 100 (non Vahl). C. P. 3931.

Habit of *C. diffusus,* but taller, 2–3 ft. high, stouter, l. less flaccid, umbel more compound, glumes more closely imbricate, nuts more strongly granulate.

Very rare. I have only the C. P. specimens from Kurunegala, collected in 1853 by Thwaites. Var. *pubisquama*, intermediate region, Kurunegala, Monankande, W. Matale.

In all warm countries. Var. β, Assam, Burma, Malaya, &c.

The thin, broad, flaccid leaves are a conspicuous character. Both Mr. Clarke (Fl. B. Ind.) and Dr. Trimen suggest *C. pubisquama* being a variety of *diffusus*. I can find no pubescence on the glumes of Ceylon specimens.

23. **C. articulatus,** *Linn. Sp. Pl.* 66 (1753).
Thw. Enum. 343. C. P. 3561.
Fl. B. Ind. vi. 611.

Perennial; rootstock stout, woody, stoloniferous, stolons stout, $\frac{1}{8}$–$\frac{1}{6}$ in. diam., clothed with ovate-lanceolate striate dark brown scales $\frac{2}{3}$ in long; stem terete 3–6 ft., often $\frac{3}{4}$ in. diam. at the base, and $\frac{1}{8}$–$\frac{1}{6}$ in. diam. and obscurely trigonous at the top, pseudo-septate when dry; l. o or sheaths elongate, loose, with a short sometimes foliaceous limb; umbel compound, narrow, rays up to 10, erect, 2–6 in. long, very slender and secondaries terminating in corymbs of very many long slender spikelets, pale reddish-brown; bracts 1–3, very short, ovate or lanceolate, acute, bracteoles o, or 3 ovate, acute, or setaceous; spikelets 5–15, linear, 1$\frac{1}{3}$–1$\frac{1}{4}$ by $\frac{1}{20}$–$\frac{1}{15}$ in., 12–50-fld., rhachilla slender, with hyaline at length deciduous wings; glumes suberect, loosely imbricate, oblong, obtuse, concave, dorsally rounded, 3–5-veined, not keeled, sides broadly membranous, stam. 3, anth. linear; nut half as long as the glume, oblong, trigonous, acute at both ends, dark brown, smooth, style very short, stigmas 3, very long, capillary.

In water in the low country; very common. Fl. March.
Throughout the Tropics.

24. **C. corymbosus,** *Rottb. Descr. et Ic.* 42 (1773). **Gal-éhi,** *S.*
Thw. Enum. 344. C. P. 809.
Fl. Ind. vi. 612. Rottb. l. c. t. 7, f. 4 (infl. only).

Perennial; rootstock stout, creeping, root-fibres stout; stem 2–3 ft., as thick as a goose-quill, spongy, appearing pseudo-septate when dry, terete below, subtrigonous above; l. o, or a short blade, rarely 6 in. long, terminating a long loose membranous sheath; umbel compound, narrow, rays 6–8, erect or suberect, very unequal, longest 4 in., bearing secondary rays terminated by spikes or corymbs of 4–8 very slender spikelets; bracts 3, very short, rarely as long as the umbel, keeled, green, margins recurved when dry, bracteoles setaceous; spikelets very variable in length, $\frac{1}{4}$–1 in., linear, very slender, $\frac{1}{20}$ in. diam., subterete, pale red, rhachilla narrowly winged; glumes erect, rather distant but appressed, oblong, obtuse, rather membranous, dorsally rounded and 3-veined,

sides pale, veinless; stam. 3, anth. linear, muticous; nut minute, not half the length of the glume, ellipsoid, trigonous, style about as long as the nut, stigmas 3, very long, capillary.

Moist region; in wet places up to 3000 ft.; rather common. Fl. Dec.–Feb.

Tropics generally.

This is considered to be the best sedge for mat-making here, and is occasionally cultivated for the purpose.

25. **C. dehiscens,** *Nees in Linnæa,* ix. 286 (1835). **Hewan-pan,** *S.*

*C. Pangorei,** Thw. Enum. 344 (non Rottb.). Trim. Syst. Cat. 100. C. P. 813.

Fl. B. Ind. vi. 613. (*C. tegetum,* Rottb.).

Perennial; rootstock stout, horizontal, woody, root-fibres wiry, clothed with branched root-hairs; stem 3–6 ft., stout, triquetrous, angles quite smooth; l. 0, or reduced to long loose sheaths, the uppermost of which has sometimes a short blade, at others a limb up to 8 in. by $\frac{1}{4}$ in., rarely 16 by $\frac{1}{3}$ in., acuminate, flat 1–3-veined, pale beneath, margins nearly smooth; umbel large, compound or decompound, 4–12 in. diam., rays many, 1–3 in., bearing corymbs of pedicelled spikes, each with 4–10 very slender spikelets on a filiform rhachis; bracts 3–4, one or more longer than the umbel, longest up to 15 in., keel and margins scabrid; spikelets rather distant, $\frac{1}{3}$–1 by $\frac{1}{20}$ in., linear, 10–30-fld., pale or dark chestnut-brown, wings of rhachilla ovate, acute, caducous; glumes suberect, loosely imbricate, ovate-oblong, obtuse, dorsally 3–5-veined, not keeled, sides red-brown, veinless, margins narrowly scarious; stam. 3, anth. narrow, muticous; nut $\frac{1}{2}$ the length of the glume, linear-oblong, obtuse, trigonous, style short, stigmas 3, filiform.

In rivers and streams in the low country; common. Fl. Dec.–March.

Also in Peninsular India.

Very abundant in the Mahaweli River in Dumbara, where it is largely collected for making the mats called after that district.

I follow Trimen in regarding this as distinct from Roxburgh's *C. tegetum,* though failing to find any valid characters by which to separate it.

26. **C. distans,** *L. f. Suppl. Pl.* 103 (1781.)

Thw. Enum. 344. C. P. 810.

Fl. B. Ind. vi. 607. Jacq. Ic. Rar. t. 299. Roxb. l. c. t. 10 (*C. elatus*).

Perennial; rootstock stout, short or elongate, creeping, stoloniferous, stolons up to 2 ft. long, clothed with dark brown

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* Pangorei is, according to Kœnig (?), the name given by the natives of Tranquebar to this or an allied sedge.

elliptic scales; stem 1–3 ft., slender, trigonous below, triquetrous above, angles smooth; l. shorter than the stem, linear, hardly $\frac{1}{6}$ in. broad, keeled, margins smooth or scaberulous; umbel subsimple or compound, 8–12 in. diam., rays 6–10, triquetrous, bearing spikes $\frac{1}{2}$–2 in. long of very slender horizontally spreading spikelets on a filiform rhachis; bracts 3–6, much longer than the leaves, longest up to 16 in., and up to $\frac{1}{3}$ in. broad, keel and margins scaberulous; spikelets $\frac{1}{3}$ by $\frac{1}{30}$ in., very narrowly linear, 10–20-fld., red-brown; wings of slender wavy rhachilla oblong, internodes $\frac{1}{3}$ as long as the glumes; glumes distant, suberect, elliptic-oblong, obtuse, dorsally 7–9-veined, margins broad or narrow, pale, keel prominent; nut from $\frac{1}{2}$ to nearly as long as the glume, narrowly oblong or ellipsoid, trigonous, dusky black, style about as long as the nut, stigmas 3, capillary.

Margins of ponds, &c., in low country; very common. Fl. Dec., &c. All hot countries, extending to S. Europe.

27. **C. nutans,** *Vahl, Enum.* ii. 363 (1806).
*C. distans*, var. *major*, Thw. Enum. 432. C. P. 3844, and 3966, in parts.
Fl. B. Ind. vi. 607.

Perennial; rootstock tuberous, thicker than the thumb in old plants, creeping, root-fibres densely matted; stem 2–3$\frac{1}{2}$ ft., stout, trigonous, angles smooth; l. as long as the stem, linear, $\frac{1}{4}$–$\frac{1}{2}$ broad, coriaceous in old plants, 1-veined, keel and margins smooth; umbel very large, decompound, primary rays up to 10 in., slender, trigonous, bearing short bracteate umbellules of very slender secondaries 1–2 in. long, each secondary terminated by many, erect, unequal simple or panicled loose spikes 1–1$\frac{1}{2}$ in. long, of small very slender spikelets, spikes forming tassel-like clusters, rhachis capillary; bracts 4–8, longest up to 1 ft. by $\frac{1}{2}$ in. broad, margins and keel smooth, spikelets erect, $\frac{1}{6}$–$\frac{1}{4}$ by $\frac{1}{50}$ in. broad, very slender, 6–10-fld., pale red-brown, rhachilla capillary, internodes $\frac{1}{3}$ as long as the glumes or longer, wings broadly lanceolate, caducous; glumes distant, erect, ovate-oblong, tip rounded, sometimes apiculate, dorsally rounded, obscurely veined, sides involute, margins and tip very narrowly hyaline; stam. 3, anth. linear-oblong, obscurely crested; nut $\frac{3}{4}$ as long as the glume, linear-oblong, trigonous, narrowed at both ends, beaked, dark brown or grey-black, style $\frac{1}{4}$ shorter than the nut, stigmas 3, short, capillary.

Tanks and other wet places in the dry country; rather common. Fl. Dec., &c.
Also in Peninsular India.
Difficult to distinguish some forms of this from *C. distans*, though

generally recognisable by the tassel-like clusters of spikes, and very small short few-fld. spikelets.

28. **C. pilosus,** *Vahl, Enum. Pl.* ii. 354 (1806).
Thw. Enum. 344. C. P. 797.
Fl. B. Ind. vi. 609.

Perennial; rootstock small, stoloniferous, stolons slender, internodes long, scaly; stem 3 ft., stout, subsolitary, triquetrous above, angles smooth; l. nearly as long as the stem, or shorter, linear, $\frac{1}{6}$ in. broad, finely acuminate, margins scaberulous; umbels compound, up to 16 in. diam., primary rays 2–10, all short, or one or more up to 2 or 3 in., bearing crowded pedicelled spikes of divaricate spikelets, rhachis of spikes angular, hispidulous, not pitted; bracts 3–5, longest 3–5 in., margins scaberulous; spikelets closely imbricate, $\frac{1}{4}$–$\frac{1}{2}$ by $\frac{1}{10}$ in., linear or linear-lanceolate, compressed, 10–20-fld., reddish-brown, rhachilla naked or obscurely winged; glumes rather loosely imbricate, broadly ovate, obtuse, muticous, dorsally green, hardly keeled, 3–7-veined, sides red-brown, margins and tip hyaline; stam. 3, anth. small, linear, muticous; nut half as long as the glume, globosely trigonous, narrowed at both ends, apiculate, black, style rather shorter than the nut, stigmas 3, capillary.

Wet places up to 5600 ft.; common. Fl. July.
Throughout Tropics of Old World.
The hispidulous rhachis of the spikes, bearing the spikelets, is almost peculiar to this amongst Ceylon species; but there is an approach to it in the closely allied *C. procerus.*

29. **C. exaltatus,** *Retz. Obs. Bot.* v. 11 (1789).
Thw. Enum. 343. C. P. 3040.
Fl. B. Ind. vi. 617. Burm. Fl. Ind. t. 8. f. 2 (*C. odoratus*).

Perennial (?); stem 3–6 ft., stout, obtusely trigonous, sides concave, base thickened, stolons 0, root-fibres stout; l. few, longer or shorter than the stem, linear, $\frac{1}{4}$–$\frac{1}{3}$ in. broad, thick, tips filiform, 1-veined, margins scaberulous; umbel compound, rays 5–10, some up to 6 in., slender, spreading, bearing spikes $\frac{1}{4}$–2 in. long, of 20–40 rather distant horizontally spreading short spikelets, rhachis of spikes smooth, very slender; bracts 3 or 4, one or two as long as the umbel or longer, margins nearly smooth; spikelets linear or linear-oblong, anth. $\frac{1}{6}$–$\frac{1}{3}$ by about $\frac{1}{15}$ in., much compressed, chestnut-brown; wings of rhachilla very narrow; glumes closely imbricate, broadly ovate, subacute or cuspidate, dorsally keeled, obscurely 3-veined, margins broad, not hyaline; nut about $\frac{1}{3}$ as long as the glume, broadly ellipsoid, narrowed at both ends, trigonous, ashy black, style longer than the nut, stigmas 3, short.

Var. β, **amœnus,** *Clarke in Journ. Linn. Soc.* xxi. 187 (1886). C. amœnus, *Kœn. MSS.* C. venustus, Thw. Enum. 432. C. P. 3788.

Umbels more compound, rays more numerous, up to 7 in. long, spikes with more crowded suberect spikelets, rhachilla not, or obscurely, winged.

Sides of ponds and standing water; common. Fl. Dec., &c.
All tropical and warm countries.
Mr. Clarke informs me that the var. *amœnus* was not taken up in Fl. B. Ind., because he found it to be inseparable from ordinary forms of *exaltatus.* Dr. Trimen has, however, retained it in his list prepared for this work, and I therefore enter it here, whilst so far agreeing with Mr. Clarke in his opinion, that I think it hardly deserves recognition.

30. **C. tuberosus,** *Rottb. Descr. et Ic.* 28 (1773).
*C. Retzii,* Nees; Thw. Enum. 343. *C. rotundus,* var. *procerula.* Clarke in Journ. Linn. Soc. xxi. 172. Trim. Syst. Cat. 100. C. P. 3750.
Fl. B. Ind. vi. 616. Rottb. l. c. t. 7, f. 1 (not good).

Perennial; rootstock creeping, woody, stoloniferous, stolons not tuberiferous, root-fibres filiform, covered with branching root-hairs; stem 2–4 ft., slender, trigonous, base tuberous; l. mostly radical, shorter than the stem, slender, up to $\frac{1}{6}$ in. broad, margins smooth; umbel compound, 4–8 in. diam., rays few or many, slender, spreading, up to 6 in. long, and secondary rays terminating in 6–8 approximate, spreading, pale spikelets; bracts 3–4, longest 1–2 ft., margins smooth; spikelets sessile, $\frac{1}{2}$–$\frac{2}{3}$ by $\frac{1}{10}$ in. linear, acuminate, compressed but rather turgid along the middle line, 16–24-fld., shining, pale red-brown; glumes large, loosely imbricate, suberect, $\frac{1}{5}$–$\frac{1}{6}$ in. long, ovate-lanceolate, acuminate, keeled, hyaline with a narrow tri-angular sub-3-veined centre; rhachilla slender, wings oblong; stam. 3, anth. very narrow, muticous; nut $\frac{1}{3}$ the length of the glume, broadly obovoid, trigonous, umbonate, greyish-black; style much longer than the nut, stigmas 3, capillary.

Wet places in the low country; rare. 'Central Prov.' (Thwaites). Var. β, in the dry region. Dimbula; near Hambantota. Fl. Dec.–March.
Also in India, Mauritius, Australia.
Trimen has var. β, *tenuiflorus* (C. tenuiflorus) Rottb., Trim. Cat. 100) of which he says, 'I should feel inclined to consider var. β a distinct species, but it is not reckoned even a variety in Fl. B. Ind.' According to the very poor specimens of this in Herb. Peraden., I am inclined to refer it to *C. rotundus.*

31. **C. compressus,** *L. Sp. Pl.* 68 (1753).
Thw. Enum. 342. C. P. 812.
Fl. B. Ind. vi. 605. Rottb. Descr. et Ic. t. 9, f. 3.

A tufted annual, stems 4–16 in., erect, slender, trigonous, angles rounded, smooth; l. longer or shorter than the stem,

slender, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, finely acuminate, 1-veined; umbel simple, rays 3–6, up to 3 in. long, bearing 4–6 terminal spikes of spreading pale spikelets, or spikes very short and spikelets crowded in a solitary terminal head; bracts 3–5, finely acuminate, longest up to 4 in., margins smooth; spikelets $\frac{1}{2}$–1$\frac{1}{4}$ by $\frac{1}{8}$–$\frac{1}{6}$ in., oblong or linear, 20–60-fld., reddish-green, rhachilla stout, angular, closely scarred, wings oblong; glumes $\frac{1}{8}$ in. long, closely imbricate, ovate, obtuse, dorsally keeled and cuspidate from above the middle, coriaceous, sides membranous, 3–5-veined, cusp green, laterally compressed; stam. 3, anth. linear, muticous; nut $\frac{1}{3}$ the length of the glume, globosely obovoid, obtusely trigonous, greyish-black, style as long as the nut, stigmas 3, capillary.

Damp grassy places in the low country; very common. Fl. Feb., &c. All warm countries (except Australia).

This species rather belongs to the division with stellately spreading spikelets.

32. **C. procerus,** *Rottb. Descr. et Ic.* 29 (1773).
Thw. Enum. 343. C. P. 3752.
Fl. B. Ind. vi. 610. Rottb. l. c, t. 5, f. 3.

Perennial; rootstock short, stout, stoloniferous, stolons elongate, clothed with elongate acuminate scales, bulbilliferous; stem 3–4 ft., deeply triquetrous or 3-winged, angles scaberulous; l. very long, triquetrous, $\frac{1}{4}$–$\frac{1}{2}$ in. broad, acuminate, thickly coriaceous or spongy, flattened towards the base, margin scabrid, sheath broad, compressed, membranous; umbel 3–6 in. diam., compound, primary rays 3–7, 3–5 in. long, stout, and secondary bearing loosely corymbose spikes of 5–10 long spreading compressed spikelets, rhachis of spikes rather stout, flexuous, angular, glabrous or angles puberulous; bracts 2–5, longest up to 12 in., much thinner than the l., margins almost smooth; spikelets distant, divaricate, $\frac{1}{4}$–1$\frac{1}{4}$ by $\frac{1}{6}$–$\frac{1}{5}$ in., linear or linear-oblong, acute, 10–50-fld., straw-col'd. or red, shining, rhachilla striate, tetragonous, minutely notched, winged here and there; glumes rather loosely imbricate, orbicular, cymbiform, muticous, dorsally 5 or more veined, mottled with red-brown, sides pale, margins hyaline; stam. 3, anth. large, oblong, muticous; nut half as long as the glume, broadly obovoid, mucronate, trigonous, almost black, style nearly as long as the nut, stigmas 3, capillary.

Wet places, especially in the dry region. Colombo; Anuradhapura; Batticaloa. Fl. Oct.–March.

India, Cochin China, Malaya.

Closely allied to *C. pilosus*, differing in the more open infl., larger spikelets, and nearly or wholly glabrous rhachilla of the spike.

33. **C. Zollingeri,** *Steud. in Zoll. Verz. Ind. Archip.* ii. 62 (1854).
*C. compressus*, var., Thw. Enum. 342. *C. tenuiculmis*, Boeck. in Linnæa, xxxvi. 286. *C. lucidulus*, Clarke in Journ. Linn. Soc. xxi. 99; Trim. Syst. Cat. 100 (non Klein). C. P. 807.
Fl. B. Ind. vi. 613.

Perennial; rootstock short, stout, root-fibres strong; stems solitary or 2–3-nate, 1–3 ft., slender, triquetrous, faces hollow, angles smooth; l. shorter than the stem, very narrow, about $\frac{1}{6}$ in. broad, 1-veined, margins smooth; umbel simple or compound, rays 3–6, very slender, 3–6 in. long, bearing 3–5 spikelets, sometimes crowded and very short when the spikelets form a confused fascicle or head; bracts 2 or 3, short, and one as long as the umbel or longer; spikelets sessile or pedicelled, $\frac{1}{2}$–nearly 1 by $\frac{1}{8}$ in. broad, linear, acute, not strongly compressed, about 20-fld., rhachilla slender, flexuous, internodes $\frac{1}{3}$ of the glume in length, wings large, oblong, caducous; glumes suberect, loosely imbricate, broadly ovate, subacute, cymbiform, dorsally 5–7-veined, keeled, green, sides coriaceous, brown, margins very narrowly hyaline; stam. 3, anth. linear-oblong, muticous; nut half as long as the glume, shortly obovoid, obtuse, trigonous, black, style as long as the nut, stigmas 3, capillary.

Wet places in low country; apparently rare. Peradeniya; near Tissa Tank, S. Prov. Patanas of Uva and of the Central Province, alt. 3000–5600 ft. (Pearson). Fl. Oct.–Dec.
Throughout Tropics of Old World.

34. **C. rotundus,** *L. Sp. Pl.* 45 (1753). **Kalanduru,** *S.* **Korai,** *T.*
Herm. Mus. 2. Burm. Thes. 107. Fl. Zeyl. n. 36. Moon, Cat. 6. Thw. Enum. 343 (part). C. P. 804 and 3966 (partim).
Fl. B. Ind. vi. 614. Rottb. l. c. t. 14, f. 2 (*C. hexastachyos*).

Perennial; rootstock small, tuberous, stoloniferous, stolons elongate, slender, bearing ovoid, hard, tunicate, black, fragrant tubers $\frac{1}{3}$–1 in. diam., root-fibres wiry, covered with flexuous root-hairs; stems subsolitary, 6–24 in., slender, trigonous below, triquetrous above, base sometimes tuberous; l. subradical, shorter or longer than the stem, narrowly linear, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, finely acuminate, or narrowed from the middle to both ends, flat, flaccid, 1-veined; umbel simple or compound, primary rays 2–8, unequal, very slender, bearing short spikes of 4–10 slender spreading red-brown spikelets (infl, sometimes contracted into a head); bracts 3, longest up to 7 in.; spikelets $\frac{1}{2}$–$1\frac{1}{4}$, by $\frac{1}{16}$ in., linear, acute, slightly compressed, 10–20-fld., pale or dark red-brown; rhachilla very slender, wings elliptic; glumes about $\frac{1}{15}$–$\frac{1}{10}$ in., closely or loosely imbricate, suberect, ovate, obtuse, dorsally green, hardly keeled, streaked

with red-brown, 5–7-veined, sides broadly membranous, margins and tip narrowly scarious; stam. 3, anth. long, narrow, muticous; nut $\frac{1}{3}$ the length of the glume, obovoid or oblong, obtuse, trigonous, black, opaque, granulate, style shorter than the nut, stigmas 3, capillary.

Cultivated ground in the low country; a very common and a troublesome weed. Fl. all the year (?).

All hot countries.

A pestilent weed in many countries. The tubers yield a perfume, and are astringent and diuretic. It is difficult to distinguish from states of *C. tuberosus* in the absence of the tubers of the latter. The long flaccid l. and slender habit distinguish it from *C. stoloniferus.*

35. **C. stoloniferus,** *Retz. Obs.* iv. 10 (1786).
Clarke in Journ. Linn. Soc. xxi. 173. C. P. 3005 in part.
Fl. B. Ind. vi. 615.

Perennial; rootstock of elongate, stout, woody, creeping, branching stolons, clothed with hard acute scales, and bearing ovoid persistent leafing and eventually flowering tubers; stems 4–8 in., distant on the rootstock, slender or rather stout, rigid, base tuberous, obtusely trigonous, angles smooth; l. as long as the stem or shorter, erect or recurved, rigid, very variable in breadth, often subulate and squarrosely recurved, sometimes flat or complicate, margins scabrid above; umbel simple, rays from almost 0 to 1 in., rather stout, bearing 3–8 subterminal spreading pale spikelets; bracts 3, leaf-like, longest up to 3 in.; spikelets $\frac{1}{4}$–$\frac{1}{2}$ in., linear or linear-oblong, acute, not strongly compressed, 12–20-fld., more or less red, rhachilla stout, narrowly winged; glumes $\frac{1}{8}$ in. long, closely imbricate, very persistent, broadly or orbicularly ovate, obtuse, membranous with broad hyaline margins, dorsally rounded, 5–7-veined, speckled with red-brown; stam. 3, anth. nearly as long as the glume, subacute; nut half as long as the glume or more, obovoid, strongly dorsally compressed, obtusely trigonous, top rounded, often apiculate by the style-base, dark brown, polished, style stout, rather shorter than the nut, stigmas long, rather stout, capillary.

Sandy seashores: Galle (Gardner), Calpentyra (Trimen). Fl. Jan., &c.

Shores of the Indian and Malayan Peninsulas, Mauritius, China, Malaya, Australia.

Probably a common littoral sand-loving plant, but overlooked. I have seen only two Ceylon specimens, a very small one from Galle (without stolons), and a larger from Trimen with imperfect leaves. The spikelets are commonly described as terete in Fl. B. Ind. I am doubtful of this being the *C. stoloniferus* of Retz., which may be *C. rotundus* from the meagre description.—J. D. H.

36. **C. digitatus,** *Roxb. Fl. Ind.* i. 205 (1832).
*C. auricomus*, Clarke, l. c. 188; Trim. Syst. Cat. 100. C. P. 3940.
Fl. B. Ind. vi. 618.

Perennial; rootstock stout, woody, creeping, stolons 0; root-fibres stout; stem 1–4 ft., as thick as the thumb at the bases, above trigonous, angles smooth; l. longer or shorter than the stem, $\frac{1}{2}$–$\frac{2}{3}$ in. broad, flat, coriaceous, veins faint, margins and keel scaberulous; umbel very large, broad, up to 8 in. diam., subsimple, rays 4–10, up to 2–6 in., long, trigonous, terminated by stellately spreading sessile cylindric spikes of unequal length, loosely set all round with innumerable spreading yellow-brown spikelets; bracts 3–6, leaf-like, longest a foot long, bracteoles very slender; spikes 1–1$\frac{1}{2}$ in., by $\frac{1}{3}$–$\frac{1}{2}$ in. diam., sessile or a few pedicelled; spikelets spirally inserted round the slender angular rhachis, $\frac{1}{10}$–$\frac{1}{4}$ by $\frac{1}{30}$ in. diameter, terete, acute, 12–20-fld., spreading horizontally, wings of rhachilla lanceolate, acuminate; glumes minute, $\frac{1}{15}$ in., broadly oblong, obtuse, coriaceous, tip rounded, cuspidate, dorsally rounded, 3-veined, sides hyaline, centre chestnut, brown; stam. 3, anth. linear-oblong, scarcely crested; nut $\frac{1}{2}$ as long as the glume, small or obovoid, ovoid-oblong or trigonous, acute at both ends, straight or curved, grey, opaque, style half as long as the nut, stigmas 3, capillary.

Var. β, **Hookeri,** *Clarke in Fl. B. Ind.* vi. 618. C. Hookeri, *Boeck.* in *Linnæa*, xxxvi. 308. C. Neesii, *Thw. Enum.* 344 (? *Kunth*). C. P. 3043.

Spikes more numerous, larger, up to 3$\frac{1}{2}$ in., with close-set more-spreading golden brown shining spikelets, glumes more strongly cuspidate.

Wet places in the dry region. Trincomalie (Glenie). Var. β in the moist region up to 3000 ft.; rather common. Fl. Jan.–Sept.

Also in India and Malaya, Australia.

A very handsome species, especially var. β, of which the type appears rather as a depauperate form.—J. D. H.

37. **C. eleusinoides,** *Kunth, Enum. Pl.* ii. 39 (1837).
*C. xanthopus*, Steud.; Thw. Enum. 344. C. P. 3044.
Fl. B. Ind. vi. 608.

Perennial; rootstock woody, with short lateral shoots, but no true stolons, root-fibres stout; stem tall, 1$\frac{1}{2}$–4 ft., stout, triquetrous, angles smooth; l. long, up to $\frac{1}{3}$ in. broad, flat, midrib stout, margins and keel scaberulous, sheath long; umbel erect, compound, 6–8 in. long, contracted, rays 4–8 in., rather stout, trigonous; spikes sessile and peduncled, $\frac{1}{2}$–1 in. by $\frac{1}{4}$–$\frac{1}{3}$ in. diam., green, bracteolate; bracts 3 or 4, one or two longer than the umbel, leaf-like, bracteoles filiform or subulate, rhachis of spikes sometimes winged, more or less clothed with empty glumes; spikelets most densely imbricating, $\frac{1}{10}$–$\frac{1}{6}$ in. long, or longer, erect, linear or oblong, flat, few or many-fld., green, rhachilla winged; glumes closely

imbricate, $\frac{1}{15}$ in. long, ovate, obtuse, dorsally rounded and faintly veined, margins hyaline; stam. 3, anth. very small, oblong, obtuse; nut from $\frac{1}{3}$ shorter to nearly as long as the glume, shortly stipitate, ellipsoid oblong or subobovoid, trigonous, beaked, sometimes curved, pale, style shorter than the nut, stigmas 3, filiform.

In water; very rare. Haragama. Fl. July.
India, Asia generally, Africa, Australia.

38. **C. platyphyllus,** *Roem. and Sch. Syst.* ii. 876 (1817).
*C. Roxburghii*, Nees; Thw. Enum. 343. C. P. 3041.
Fl. B. Ind. vi. 618.

Perennial; rootstock woody, as thick as the thumb, stolons 0, root-fibres stout; stem 6–20 ft., stout, triquetrous, base thickened, angles scabrid, cutting; l. as long as the stem, up to 1 in. broad, flat, 3-veined, keel and margins serrulate, whitish beneath when dry; umbel decompound, 3–4 in. diam., rays 8–10, stout, erect, 4–10 in. long, trigonous towards the top, bearing large brush-like fascicles of 6–20 long, stout, narrow cylindric spikes; bracts 4–6, longest up to 20 in., bracteoles shorter than the spikes; spikes 1–3 in. by $\frac{1}{5}$ in. diam., of innumerable small spirally arranged spikelets; spikelets suberect, $\frac{1}{6}$–$\frac{1}{5}$ in. long, subterete, acute, 10–14-fld., golden-brown, shining, wings of rhachilla broadly lanceolate, acuminate, deciduous; glumes very closely imbricate, broadly ovate, obtuse, cymbiform, apiculate, dorsally rounded, 3-veined, sides broadly hyaline; stam. 3, anth. narrow, tipped with a scabrid appendage about half as long as the cells; nut $\frac{1}{2}$–$\frac{2}{3}$ as long as the glume, ellipsoid, trigonous, narrowed at the top, style shorter than the nut, stigmas 3, capillary.

Ponds in the moist low country; rather rare. Kukul Korale, Matara. Fl. Dec.–Feb.
Also on Coromandel coast.
Our largest species.

39. **C. alopecuroides,** *Rottb. Descr. et Ic.* 38 (1773).
Thw. Enum. 342. C. P. 3560.
Fl. B. Ind. vi. 595 (*Juncellus*). Rottb. l. c. t. 8, f. 2.

Perennial; rootstock short, stout, stolons 0, root-fibres very stout and slender mixed; stem 2–3 ft., stout, 1 in. and more in diam. towards the base, trigonous, leafy, angles smooth; l. many, as long as the stem or shorter, $\frac{1}{3}$–$\frac{1}{2}$ in. broad, coriaceous, acute, 3-veined, white beneath, keel and margins scaberulous towards the tip, umbel large, compound, primary rays 4–6, up to 4 in. long, slender, secondary up to 1 in., bearing clusters of oblong, cylindric, sessile and peduncled spikes $\frac{2}{3}$–$1\frac{1}{4}$ in. by $\frac{1}{3}$–$\frac{1}{2}$ in. diam., densely covered with small

spikelets, rhachis of spike stout; bracts up to 18 in. long by $\frac{1}{2}$ in. broad at the base, bracteoles 0; spikelets about $\frac{1}{4}$ in., linear to ovate-oblong, subtetragonous, acute, straw-col'd., rhachilla subtetragonous, not winged; glumes membranous, loosely imbricate, $\frac{1}{12}$ in. long, broadly ovate-oblong, or nearly orbicular, cuspidate or mucronulate, dorsally rounded, not keeled, streaked with pale brown, veins obscure, margins broadly hyaline; stam. 3, anth. linear, muticous; nut about $\frac{1}{2}$ the length of the glume, ellipsoid, dorsally compressed, plano-convex or biconvex, top umbonate, ashy black, young straw-col'd., style as long as the nut, stigmas 2, capillary.

In tanks in the dry country; rather common. Batticaloa; Mineri; Tissumabarama, &c.; abundant. Fl. March–Sept.

Also in India, N. and Trop. Africa, and Australia.

Strongly resembles *Mariscus albescens.* Described as annual in Fl. B. Ind., but by Boissier as having a stout rootstock.

## 2. **MARISCUS,** *Vahl.*

Characters of *Cyperus*, but rhachilla of spikelets disarticulating above the 2 lowest glumes; lowest glume broadly ovate, many-veined, persistent on the rhachilla, next above shorter, broader, also many-veined, often deciduous with the spikelet; upper glumes 1 or more, much longer, 3-veined on the keel; nut trigonous, stigmas 3, capillary.—Sp. about 70; 13 in *Fl. B. Ind.*

In *Cyperus eleusinoides* there is a tendency to disarticulation of the rhachilla of the spikelet. Sp. 4, 5, 6 are with difficulty separable.

| | |
|---|---|
| Spikelets turgid, 4–6-fld. | |
| Spikelets in a globose head . . . . | 1. M. Dregeanus. |
| Spikelets in umbelled spikes . . . . | 2. M. albescens. |
| Spikelets narrow. | |
| Spikelets in umbelled, globose heads . . | 3. M. microcephalus. |
| Spikelets spicate. | |
| Stem rather stout, l. $\frac{1}{6}$–$\frac{1}{4}$ in. broad. | |
| Stolons tuberiferous . . . . | 4. M. paniceus. |
| Stolons 0. | |
| Spikelets erect or spreading . . | 5. M. cyperinus. |
| Spikelets spreading or reflexed . . | 6. M. Sieberianus. |
| Stem and l. narrow or filiform . . . | 7. M. tenuifolius. |

1. **M. Dregeanus,** *Kunth, Enum. Pl.* ii. 120 (1837).

*Cyperus dubius*, Thw. Enum. 344; Trim. Syst. Cat. Ceyl. 101 (non Rottb.). C. P. 855, 2942.

Fl. B. Ind. vi. 620.

Annual; stem 3–16 in., densely tufted, stout, trigonous, often curved, base tuberous, root-fibres capillary, stolons 0; l. as long as the stem or shorter, narrow, up to $\frac{1}{6}$ in. broad, flaccid, 1-veined, sheath usually long; bracts 3–5, leaf-like;

spikes sessile, densely crowded in a globose head $\frac{2}{3}$ in. diam. or less, rhachis very short, stout, concealed after the fall of the spikelets by the persistent lowest glumes; spikelets $\frac{1}{5}$–$\frac{1}{4}$ in., ovate-oblong, turgid, 4–6-fld., rhachilla very short, winged; glumes closely imbricate, orbicular-ovate, deeply cymbiform, subacute or apiculate, many-veined, dorsally rounded, not keeled, greenish, speckled with red-brown, margins hyaline; stam. 3, anth. very small, oblong; nut shortly stipitate, $\frac{1}{3}$ to $\frac{1}{2}$ the length of the glume, obovoid or oblong, trigonous, cuspidate, black, style shorter than the nut.

Damp ground in the low country; rather rare. Galle (Gardner); Kurunegala; Lunugala, Uva. Western Province on the seashore (Pearson). Fl. all the year.

Also in India, Malaya, and S. Africa.

2. **M. albescens,** *Gaud. in Freyc. Voy. Bot.* 415 (1826). **Ramba,** *S.* **Irampai,** *T.*

*Cyperus pennatus*, Lam.; Thw. Enum. 343. C. P. 678.
Fl. B. Ind. vi. 623. Rheede, Hort. Mal. xii. t. 55.

Perennial; rootstock tuberous, woody, stoloniferous, root-fibres very stout; stem 2–3 ft., stout, trigonous, smooth; l. many, longer than the stem, up to 6 ft. by $\frac{1}{3}$ in. or more broad, coriaceous, 1-veined, margins and keel scaberulous; umbel compound, 4–8 in. diam., rays 4–8, rather stout, bearing short ternate secondary rays with spreading cylindric sessile spikes $\frac{1}{2}$–1 in. long, covered with stout horizontally spreading spikelets; rhachis of spike rather stout, loosely clothed with the persistent scarious lower glumes; bracts 4–6, leaf-like, up to 16 in. long; spikelets $\frac{1}{4}$ in. long, ovoid or lanceolate, acuminate, almost terete, 3–5-fld., pale brown or straw-col'd.; rhachilla with very short winged internodes; glumes closely imbricate, rather thin, broadly ovate or almost orbicular, obtuse, dorsally rounded, not keeled, striolate with brown, veins many very slender, margin narrowly hyaline; stam. 3, anth. very small oblong; nut not stipitate, $\frac{1}{2}$ as long as the glume, broadly oval, trigonous, cuspidate, narrowed at the base, black, style about as long as the nut.

Tanks, &c.. in the low country, especially in the dry region; common. Fl. Sept.–March.

Tropics of the Old World generally.

The leaves of this species are described in Fl. B. Ind. as being transversely lineolate, which character does not hold good for the Ceylon specimens.

3. **M. microcephalus,** *Presl, Rel. Haenk.* i. 182 (1830).

*Cyperus dilutus*, Vahl; Thw. Enum. 344. C. P. 815.
Fl. B. Ind. vi. 624.

Perennial; rootstock short; stem. 1–5 ft., stout, obtusely trigonous, smooth; l. as long as the stem or longer, up to $\frac{1}{2}$ in. broad, 3-veined, coriaceous or spongy, margins and keel scaberulous; umbel very large, decompound, rays many, trigonous, up to 6 in. long, simple or bearing secondary or tertiary umbels, the ultimate rays terminated by globose heads (contracted spikes) $\frac{3}{4}$–$1\frac{1}{4}$ in. diam. of innumerable, narrow, stellately spreading spikelets; bracts very many, long and broad in large specimens, few and narrow in small, leaf-like; rhachis of spike $\frac{1}{10}$ in. long, persistent glumes minute; spikelets $\frac{1}{3}$–$\frac{1}{2}$ in., very slender, striate, terete, few- to 14-fld., red-brown, shining, rhachilla very slender, internodes $\frac{1}{3}$ as long as the glumes, with oblong persistent wings; glumes loosely imbricate, erect, straight, oblong, obtuse, dorsally rounded, hardly keeled, veins obscure, margins not hyaline; stam. 3, anth. nearly as long the glume, very slender, obtuse; nut about $\frac{1}{3}$ shorter than the glume, stipitate, oblanceolate, trigonous, acuminate, beaked, pale brown, style shorter than the nut, stigmas long, capillary.

Apparently very rare. I have seen only the the C. P. specimens collected by Gardner at Kurunegala in 1847. Fl. July.

Also in India, China, Malaya, Mauritius.

4. **M. paniceus,** *Vahl, Enum.* ii. 373 (1806).

*Cyperus umbellatus*, Benth.; Thw. Enum. 345; Trim. Syst. Cat. 101 (part). *C. umbellatus* var. *paniceus*, Clarke, in Journ. Linn. Soc xxi. 201. C. P. 814 (part) 2878.

Fl. B. Ind. vi. 620. Rottb. Descr. et Ic. t. 4, f. 1 (*Kyllinga panicea*).

Perennial; rootstock small, horizontal, stoloniferous; stolons slender, rigid, bearing scattered pisiform tubers; stem 4–12 in., very slender, trigonous, smooth; l. long, very narrow, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, 1-veined, filiform in small states; umbel simple, rays $\frac{1}{2}$–1 in., or spikes all sessile in the top of the stem; spikes $\frac{1}{4}$–$\frac{1}{2}$ by $\frac{1}{5}$–$\frac{1}{3}$ in. diam., cylindric, rhachis short, stout, densely covered with the persistent hyaline lower glumes of the spikelets; bracts up to 4 in. long, leaf-like; spikelets subulate, $\frac{1}{4}$ in. long, terete, green, usually 1-fld., rhachilla broadly winged above the articulation; glumes 2 above the articulation, lower larger, convolute wrapped round the upper and nut, ovate-oblong, subacute, terete, coriaceous, dorsally rounded, hardly keeled, margins narrowly hyaline, upper glume narrower, membranous, obtusely acuminate, strongly keeled; anth. long, very slender, tip subulate; nut $\frac{1}{3}$ or less shorter than the glume, narrowly oblong, acute, beaked, trigonous, pale or dark brown, style shorter than the nut.

Var. β, **Roxburghiana,** *Clarke in Fl. B. Ind.* l. c. Herm. Mus. 7. Fl. Zeyl. n. 38. *Scirpus echinatus*, L. Sp. Pl. 50.

Stem up to 2 ft., rays of umbel up to 2 in., bracts 5–7, rhachilla terminated by a rudimentary glume.

Grassy places, at low elevations; both varieties very common. Fl. all the year.
Also in Peninsular India and Mauritius.
Hermann gives the S. name for this 'Umkiri.'

5. **M. cyperinus,** *Vahl, Enum.* ii. 377 (1806).
*Cyperus umbellatus*, Thw. Enum. 345 (part). *C. biglumis*, Clarke in Journ. Linn. Soc. xxi. 199. Trim. Syst. Cat. Ceyl. 101. C. P. 816.
Fl. B. Ind. vi. 621.

Perennial; rootstock stout, stolons 0, root-fibres wiry; stem 1–2 ft., rather stout, trigonous, smooth; l. as long as the stem or shorter, up to $\frac{1}{4}$ in. broad, keel and margins scabrid; umbel of 5–10 very short, stout, trigonous rays, bearing many cylindric spikes of densely crowded spreading subulate spikelets, or spikes sessile in a compact head terminating the stem; rhachis of spike densely clothed with the hyaline lower glumes of the spikelets; bracts many, leaf-like, longest 6–8 in.; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in., terete, rigid, usually 2–3-fld., rhachilla broadly winged; glumes 2–3 above the articulation, oblong-ovate, obtuse, dorsally rounded, coriaceous, obscurely veined, hardly keeled, green streaked and speckled with brown, margins very narrowly hyaline, uppermost subulate, empty; anth. linear, very narrow, tip subulate; nut stipitate, $\frac{1}{2}$–$\frac{2}{3}$ as long as the glume, linear-oblong or oblanceolate, trigonous, pale, style shorter then the nut, stigmas short.

Low country; very common. Fl. all the year.
Throughout the warmer regions of Asia and Polynesia.
Indian forms with more compound umbels may be expected to be found in Ceylon.

6. **M. Sieberianus,** *Nees in Linnæa*, ix. 286 (1834).
Fl. B. Ind. vi. 622.

Perennial; rootstock short, stolons 0; stem 1–2 ft., trigonous, smooth; l. as long as the stem or shorter, up to $\frac{1}{6}$ in. broad, flat, keel and margins smooth, umbel 1–5 in. diam.; spikes 5–12, sessile or peduncled, usually 1–1$\frac{1}{2}$ in. long, cylindric, of many horizontally spreading and deflexed slender spikelets, ped. up to 4 in. long; bracts many, leaf-like, longest up to 6 in.; spikelets $\frac{1}{5}$–$\frac{1}{6}$ in., slender, linear or linear-lanceolate, 1–3-fld., usually shining; rhachilla broadly winged; glumes as in *M. cyperinus;* nut oblong or linear-oblong, $\frac{2}{3}$–$\frac{3}{4}$ as long as the glume, trigonous, pale brown, style shorter than the nut, stigmas short.

Trincomalie and Kandy (Herb. Mus. Brit.).
Warm regions of the Old World.

Two specimens in the British Museum, without collector's name, dated 1820, are recognised by Mr. Clarke as the only Ceylon specimens known of this common Indian plant. It is so closely allied to *M. cyperinus*, that it is difficult to distinguish it by description. In its ordinary state it is a less robust plant, with more cylindric spikes of widely spreading or reflexed often almost golden-yellow spikelets.

7. **M. tenuifolius,** *Schrad. in Mart. Fl. Bras.* ii. 1, 46 (1842).
*Cyperus umbellatus*, Benth.; Thw. Enum. 345 (part). *C. umbellatus, laxata*, Clarke; Trim. Syst. Cat. Ceyl. 101. C. P. 814 (part), 817.
Fl. B. Ind. i. 622.

Stem 12–14 in., filiform, ascending from a creeping stoloniferous rootstock; l. as long as the stem or longer, very narrow, $\frac{1}{20}$ in. broad or less, flat, 1-veined; umbel of 3–5, filiform rays $\frac{1}{2}$–2 in. long, bearing very short ebracteolate spikes of 5–10 subulate spikelets, or spikes sessile on the top of the stem, bracts 3, leaf-like, flexuous, up to 5 in., long; rhachis of spikes $\frac{1}{4}$ in. or less, slender; spikelets suberect, $\frac{1}{4}$–$\frac{1}{3}$ in. long, lanceolate, acuminate, terete, 3–4-fld., green and purplish, rhachilla winged; glumes rather thin, broadly ovate-oblong, obtuse, or tip rounded, dorsally rounded, 3-veined, hardly keeled, streaked with red, margins hyaline; anth. linear; nut $\frac{1}{3}$–$\frac{1}{2}$ shorter than the glume, dimidiate-oval, trigonous, acute at both ends, gibbous dorsally and slightly curved, dark brown, style shorter than the nut, stigmas long.

Low country; probably common. Peradeniya; Maturata. Fl. Nov. Also in Peninsular India, Behar, and Malacca.

*M. squarrosus*, Clarke, is given in Fl. B. Ind. vi. 623, as a Ceylon plant, but erroneously; a specimen of *Cyperus cuspidatus*, which it strongly resembles, was taken for it. It is a native of Bengal and Burma.

### 3. KYLLINGA, *Rottb.*

Perennial herbs, tufted or with a creeping rootstock; stem trigonous; l. narrow, chiefly radical; infl. of solitary or ternate, involucrate, short, sessile, oblong or globose spikes densely covered with minute spikelets, rhachis short, naked after the fall of the spikelets, or squarrosely covered with the more or less persistent lowest glumes; bracts leaf-like; spikelets green, strongly laterally compressed, 1–2-fld., rhachilla hardly any, disarticulating above the two lowest glumes; glumes 4, distichous: I. hyaline, lanceolate; II. orbicular or lanceolate, much shorter than III. variously veined; III. and IV. much the largest, often green and speckled with brown, subequal, or upper longest, unequal-sided, keeled, keel rarely winged, apiculate or strongly cuspidate; stam. 1–3,

anth. long or short; style long or short, base not swollen, stigmas 2, capillary; nut strongly laterally compressed, smooth, sometimes apiculate by the style-base.—Sp. 33; 6 in *Fl. B. Ind.*

Nut orbicular, style hardly any . . . . . 1. K. CYLINDRICA.
Nut oblong or obovate, style long.
  Keel of 2 upper glumes winged above . . 2. K. MONOCEPHALA.
  Keel of glumes not winged.
    Rootstock short . . . . . . . . 3. K. TRICEPS.
    Rootstock long, creeping.
      Ripe nut yellow-brown . . . . . 4. K. BREVIFOLIA.
      Ripe nut black . . . . . . . 5. K. MELANOSPERMA.

1. **K. cylindrica,** *Nees in Wight, Contrib.* 91 (1834).
Thw. Enum. 345. C. P. 3754.
Fl. B. Ind. vi. 588 (not given for Ceylon).

Glabrous or sparsely hairy, rootstock very short; stems tufted, 4–12 in., slender, base not swollen; l. usually shorter than the stem, $\frac{1}{8}$–$\frac{1}{6}$ in. broad; heads of usually three spikes, median $\frac{1}{2}$–$\frac{2}{3}$ in. long, oblong or cylindric, lateral much smaller hemispheric or globose, rhachis squarrose with the persistent lowest glumes; bracts 3–4, up to 3 in. long; spikelets about $\frac{1}{12}$ in.; glumes: I. lanceolate, 1-veined, II. orbicular, hyaline, 2–3-veined on each side, III. and IV. very broadly ovate, with short thickened recurved tips, green speckled with brown, many-veined, keels not winged, IV. rather the longest, with fewer veins; anth. small; nut orbicular or very broadly obovoid, red-brown, style very short.

Moist low country; rare. The C. P. specimens are all I have seen; from Haldummulla in the Central Province (Trimen). Fl. April.
Also in India, Singapore, Africa, Australia.
The very short style is characteristic of this species.

2. **K. monocephala,** *Rottb. Descr. et Ic.* 13 (1773). **Mottu-tana,** *S.*
Moon, Cat. 7. Thw. Enum. 345. C. P. 3753.
Fl. B. Ind. vi. 588. Rottb. l. c. t. iv. f. 4.

Sparsely hairy; stems 2–12 in., usually solitary, erect from a creeping rootstock; l. shorter than the stem, $\frac{1}{10}$–$\frac{1}{6}$ in. broad; spikes solitary or 3, the lateral very small, median $\frac{1}{4}$–$\frac{1}{3}$ in. diam., rhachis naked or pitted after the fall of the spikelets, the lowest glumes being for the most part deciduous; bracts long, narrow; spikelets $\frac{1}{10}$ in., 1-fld.; glumes: I. lanceolate, very variable in length and venation, acuminate, with sometimes a capillary point; II. broadly ovate, tip rounded, veins few; III. and IV. green, sparingly speckled with brown, cuspidately acuminate, keel dorsally winged about the middle, wings spinulose, veins 6–8 in. each, upper longest, more or less falcately incurved; anth. small; nut

obovoid or oblong, apiculate, pale red-brown, style longer or shorter than the nut.

In grassy places; very common. Fl. all the year.
Throughout the hotter regions of the Old World.
The wings of the two upper glumes sometimes undeveloped, but the keel is always spinulose, and the species may always be recognised by their glumes having their tips gradually narrowed into long cusps.

3. **K. triceps,** *Rottb. Descr. et Ic.* 14 (1773).
Moon, Cat. 7. Thw. Enum. 345. C. P. 3234.
Fl. B. Ind. vi. 587. Rottb. l. c. t. 4. f. 6.

Rootstock very short or 0; stems 6–8 in., densely tufted, thickened at the base; l. as long as the stem or shorter, $\frac{1}{12}$–$\frac{1}{6}$ in. broad; spikes 3, rarely solitary, median ovoid-oblong $\frac{1}{6}$–$\frac{1}{4}$ in. diam., lateral shorter, rhachis clothed after the fall of the spikelets with the persistent lower glumes; bracts 3 or 4, up to 3 in. long; spikelets about $\frac{1}{12}$ in., 1-fld.; glume I. lanceolate, acuminate, II. orbicular, 4-veined, III. and IV. membranous, green, not speckled with brown, obtusely apiculate, III. obovate-oblong, 7-veined, IV. rather longer, spathulate-oblong, obtuse, 5-veined; nut oblong or obovate apiculate, chestnut-brown, style rather shorter than the nut.

Low country, chiefly in the dry region; rather common. Colombo; Puttalam. Fl. June, August.
Also in India, Burma, China, Africa, Australia.

4. **K. brevifolia,** *Rottb. Descr. et Ic.* 13 (1773).
Moon, Cat. 7. Thw. Enum. 345. C. P. 3755.
Fl. B. Ind. vi. 588. Rottb. l. c. t. iv. f. 3.

Stems short or long, up to 2 ft., solitary or tufted on a creeping arching rootstock; l. half as long as the stem or shorter, rarely longer, very narrow; spikes 3, rarely solitary, globose or ovoid, $\frac{1}{6}$–$\frac{1}{3}$ in. diam., rhachis naked after the fall of the spikelets; bracts 3–4, up to 4 in. long; spikelets $\frac{1}{10}$ in. long, 1- rarely 2-fld.; glume: I. lanceolate, acuminate, II. nearly orbicular 3-veined on each side, III. and IV. green, sparingly speckled with brown, keels sparingly spinulose, strongly abruptly cuspidate, III. ovate-oblong 5-veined, IV. $\frac{1}{3}$ longer, broader, 3-veined; nut obovate, top rounded or retuse, apiculate, yellow-brown, style about as long as the nut.

Low country, rather rare (?). Galle., Central and Uva Provinces, 2000–5600 ft. (Pearson). Fl. Sept.
India and all warm countries.
Some very long slender states are *K. intermedia*, Br.

5. **K. melanosperma,** *Nees in Wight, Contrib.* 91 (1834).
Thw. Enum. 345. C. P. 2980 and 818.
Fl. B. Ind. vi. 588.

Stem short or long, up to 20 in., rather stout, solitary on a

creeping rootstock; l. shorter than the stem, linear, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, acuminate; spike solitary, globose or ovoid, about $\frac{1}{4}$ in. diam., rhachis naked after the fall of the spikelets; bracts leaf-like, up to 4 in. long; spikelets $\frac{1}{8}$ in. long, 1–2-fld.; glumes 5, I. lanceolate, acuminate, 2–3-veined, II. suborbicular, 4–6-veined, III. and IV. green, speckled with yellow-brown, strongly cuspidate, keels sometimes aculeolate, III. very broad, many-veined, IV. $\frac{1}{4}$ longer, oblong, obtuse, 5-veined, V. much smaller, narrowly oblong, hyaline, 3-veined; anth. long, linear, with a long subulate tip; nut obovoid-oblong, black, top narrowed into a truncate beak, style as long as the nut.

Montane zone, 4–6000 ft.; common.
Also in Nilgiri Mts., Malaya, S. Africa, Madagascar.
I have not seen ripe nuts in Ceylon specimens.—J. D. H.

### 4. **FIMBRISTYLIS**, *Vahl.*

Annual or perennial herbs; l. towards the base of the stem, rarely reduced to sheaths, narrowly linear or filiform; infl. terminal, of umbelled or capitate, bracteate, spikelets, bracts long or short; spikelets terete angular or compressed, many-fld.; glumes imbricate all round the rhachilla, or the lower distichous, very rarely all distichous (*F. fulvescens*), glabrous, very rarely pubescent, deciduous, lower 1–3 and sometimes the upper empty; fl. bisexual, bristles 0; stam. 1–3, fil. flat., anth. linear, obtuse, acute, or tipped with a subulate process; nut obovoid, biconvex or trigonous, very rarely cylindric (*F. tetragona*), style long, flattened or slender, glabrous, pubescent or villous, deciduous with its dilated base leaving no scar on the nut, stigmas 2 in the biconvex nuts, 3 in the trigonous, usually filiform and elongate.—Sp. about 170; 58 in *Fl. B. Ind.*

The wings of the rhachilla of the spikelets in *Fimbristylis* are here (as in *Cyperus*) portions of the base of the glumes. Each glume in most cases provides two wings, one from each side of the midrib, from which they often separate by a clean semicircular line of dehiscence.

Stigmas 2.
  Spikelets solitary, terminating the stem, rarely 2 or 3 in *polytrichoides* (see also exceptional specimens in other groups). *Eleocharoides.*
    Leaves 0, or very short. See also *ferruginea.*
      Nut cylindric . . . . . . 1. F. TETRAGONA.

Nut orbicular or obovoid.
Nut orbicular . . . . . 2. F. ACUMINATA.
Nut obovoid . . . . . . 3. F. NUTANS.
Leaves like the stem.
Nut sessile . . . . . . . 4. F. POLYTRICHOIDES.
Nut stipitate . . . . . . 5. F. SCHŒNOIDES.
Spikelets umbelled or capitate. *Dichelostylis.*
Annuals.
Spikelets umbelled.
Nut 6–9-ribbed . . . . . 6. F. DICHOTOMA.
Nut smooth.
Nut obovate, compressed . . 7. F. ÆSTIVALIS.
Nut subglobose, turgid . . 8. F. TRIMENI.
Spikelets capitate . . . . . 9. F. ARGENTEA.
Perennials (*diphylla* sometimes annual).
Spikelets glabrous.
L. 0, or very short . . . . . 10. F. FERRUGINEA.
L. many.
Glumes mucronate . . . . 11. F. DIPHYLLA.
Glumes with a rounded hyaline tip 12. F. SPATHACEA.
Spikelets pubescent . . . . . 13. F. COMPRESSA.
Stigmas 3.
Spikelets terete or polygonal (none of the glumes distichous). *Tricheiostylis.*
Annuals.
Style hairy . . . . . . . 14. F. QUINQUANGULARIS.
Style glabrous . . . . . . 15. F. MILIACEA.
Perennial.
L. 0, or minute . . . . . . 16. F. GLOBULOSA.
L. many, elongate.
Spikelets $\frac{1}{2}$–1 in. . . . . . 17. F. INSIGNIS.
Spikelets under $\frac{1}{3}$ in.
Umbel contracted . . . . 18. F. LEPTOCLADA.
Umbel effuse . . . . . 19. F. ASPERRIMA.
Spikelets compressed or trigonous, all or lower glumes only distichous (bracts in all short). *Abildgaardia.*
Spikelets 1–3.
Spikelets 2–3, $\frac{3}{4}$–1 in. long . . . 20. F. TRISTACHYA.
Spikelets 1, rarely 2, $\frac{1}{5}$–$\frac{1}{2}$ in. . . 21. F. MONOSTACHYA.
Spikelets many, umbelled or subcapitate.
Stem leafless . . . . . . 22. F. PENTAPTERA.
Stem leafy.
L. filiform (see also *F. Kraussii*).
Umbel rays 2–4 . . . . . 23. F. MONTICOLA.
Umbel rays many . . . . 24. F. CINNAMOMETORUM.
L. flat.
Spikelets flat, glumes all distichous 25. F. FULVESCENS.
Spikelets subtrigonous, lower glumes only distichous.
Style glabrous.
Glumes cuspidate . . . . 26. F. NIGRO-BRUNNEA.
Glumes mucronate or muticous.

Umbel effuse . . . 27. F. COMPLANATA.
Umbel contracted . . 28. F. KRAUSSIANA.
Style pubescent . . . 29. F. JUNCIFORMIS.

1. **F. tetragona,** *Br. Prod. Fl. Nov. Holl.* 226 (1810).
*F. Arnottii*, Thw. Enum. 348. C. P. 830.
Fl. B. Ind. vi. 631.

Perennial, glabrous; stems 6–24 in., slender, 4-angled and ribbed, root-fibres stout; l. 0, or upper with an erect, lanceolate, acuminate limb, the margins of which are scarious and brown, sheaths chestnut-brown; spikelet solitary, $\frac{1}{4}$–$\frac{1}{3}$ in., erect, conico-ovoid, obtuse, terete, dense-fld., lowest glume sometimes hardly bracteiform, at others half as long as the spikelet, coriaceous, deciduous, rhachilla elongate-conical, thickly studded with deep tetragonous pits with raised borders; glumes closely imbricate, lowest 2–3 empty, $\frac{1}{5}$ in. long, broadly oblong or obovate-oblong, concave, tip rounded, scarious with a broad coriaceous central band; anth. narrowly linear, muticous; nut $\frac{1}{15}$ in. long, stipitate, narrowly linear-oblong, narrowed downwards, trabeculate with slender parallel ribs, and minute cross bars, nearly white, style as long as the nut, flattened, pubescent, base pyriform, stigmas 2, short.

Wet places in moist low country; rather common. Fl. all the year.
Also in Peninsular India and Trop. Asia and Australia.

2. **F. acuminata,** *Vahl, Enum. Pl.* ii. 285 (1806).
Thw. Enum. 348. Nees in Wight, Contrib. 96. C. P. 2747.
Fl. B. Ind. vi. 632.

Perennial (?) densely tufted; stem 4–10 in., very slender, erect or curved, obtusely trigonous, root-fibres slender; l. very small or 0, sheath green, $\frac{1}{2}$–1 in., with a short, erect, ovate or lanceolate, acute limb often margined with brown; spikelet solitary $\frac{1}{5}$ to nearly $\frac{1}{2}$ in., erect, rarely inclined, narrowly ovoid, acute, few-fld., pale, shining, lowest glume usually broadest, with a strong green midrib, deciduous, rhachilla stout, angular, with broad raised concave facets between the glumes; glumes rather loosely imbricate, $\frac{1}{5}$–$\frac{1}{6}$ in. long, broadly ovate or obovate-oblong, obtuse, apiculate, concave, scarious with a broad coriaceous centre; stam. 3; nut orbicular or oblate, strongly dorsally compressed, about $\frac{1}{15}$ in. in transverse diam., sessile, crossed transversely of 5–6 strong waved ridges, white, opaque, style long, broad, pubescent above the middle, base hardly dilated, truncate, stigmas 2, short.

Moist hot region; common. Fl. all the year.
Throughout Trop. Asia and in Australia.

3. **F. nutans,** *Vahl, Enum. Pl.* ii. 285 (1806).
Nees in Wight, Contrib. 96. Thw. Enum. 348. C. P. 832.
Fl. B. Ind. vi. 632.

Rootstock creeping, with many stout fibrous roots; stem 10–18 in.; very slender, subtrigonous, deeply grooved, l. 0, or ovate, erect, limb bordered with brown, sheath short; spikelet solitary, $\frac{1}{8}$–$\frac{1}{2}$ in., erect or inclined, ovoid, subacute, terete, dark brown, many-fld., lowest glume bracteiform, orbicular, coriaceous, persistent, rhachilla stout, angular, with large pits between the glumes; glumes closely imbricate, $\frac{1}{6}$ in., orbicular or very broadly ovate, concave, tip rounded, apiculate, scarious with a broad coriaceous centre, lower 2–3 shorter, empty; stam. 3, anth. slender, acuminate; nut $\frac{1}{20}$ in. long, broadly obovoid, biconvex, transversely crossed by 5–6 wavy, broad, nodulose ridges, white, style very broad, pubescent, base truncate, not dilated, stigmas 2.

Moist low country; common in wet places. Fl. all the year.

Also in Burma, Nicobar Is., Borneo, China, Australia.

Differs from *F. acuminata* in the often inclined, more obtuse, many-fld. spikelets, persistent bracteiform lowest glume, and smaller more obovoid nuts.

4. **F. polytrichoides,** *Vahl, Enum. Pl.* ii. 248 (1806).

*Scirpus polytrichoides*, Retz. Obs. iv. 11; Moon, Cat. 6. Thw. Enum. 348, 433. C. P. 3786.

Fl. B. Ind. vi. 632. Rumph. Herb. Amb. vi. t. 7, f. 1.

Perennial (?) very densely tufted, root-fibres filiform; stems 4–12 in., filiform, leafy at the base, trigonous, grooved; l. half as long as the stem or more, as slender, wiry, acute, terete or trigonous, striate, sheaths with hyaline margins, glabrous or puberulous; spikelet solitary, $\frac{1}{4}$–$\frac{1}{3}$ in., erect, oblong or ovate-oblong, obtuse, terete, many-fld., lowest glumes sometimes subulate, green, as long as the spikelets and persistent, sometimes deciduous like the other glumes but shorter, broader, and empty, rhachilla stout, terete, deeply pitted; glumes $\frac{1}{6}$ in., linear-oblong, subacute or obtuse, apiculate, scarious or membranous, 1-veined, lower 2–3 shorter, broader, and empty; stam. 2–3, anth. slender, acuminate; nut obovoid or obcordate, $\frac{1}{20}$ in. long, much compressed, biconvex with rather acute margins, minutely striolate and trabeculate, pale, at length iron grey and dotted white with marcescent outer cells, style slender, sparsely hairy, base hardly dilated, stigmas 2, rather long.

Sandy seashores; common, especially in the dry region. Fl. all the year (?).

Tropics of the Old World.

5. **F. schœnoides,** *Vahl, Enum. Pl.* ii. 286 (1806).

Thw. Enum. 348. C. P. 833.

Fl. B. Ind. vi. 634.

Perennial, densely tufted, root-fibres slender; stem 6–18

in., almost filiform, obtusely angled, grooved; l. shorter but hardly broader than the stem, $\frac{1}{20}$ in. broad or less, coriaceous, striate above, dotted with the superficial cells beneath, margins recurved, spinulose, sheaths glabrous with membranous margins; spikelets solitary or 2–5 in an irregular umbel, sessile on very slender pedicels, $\frac{1}{3}$–$\frac{2}{3}$ in. long, ovoid, obtuse, terete, pale; glumes all deciduous, or the lower sometimes longer and produced into a green elongation of the stem, rhachilla slender, deeply closely pitted, squarrose with the persistent brown ovate acute lips of the pits; glumes loosely imbricate, orbicular, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, tip rounded, apiculate or cuspidate, very concave, membranous, with 5–7 very slender central veins; stam. 3, anth. acute; nut stipitate, obovate, $\frac{1}{20}$ in. long, compressed, biconvex, smooth, snow-white or discoloured, style about twice as long as the nut, dilated and villous above the middle, base subglobose, stigmas 2, short.

Var. β, **bispicata,** *Trimen. F. bispicata*, Nees in Wight, Contrib. 97 (partim). *Scirpus distachyus*, Herb. Rottl.

Rootstock stout, creeping, stem slender, 6–8 in., deeply grooved, base thickened, sometimes pyriform; spikelets one or two, sessile, with the stem produced beyond them; glumes coriaceous, brown, glaucous (as if puberulous), style villous throughout, nut immature.

Sandy places in dry and intermediate regions; rather rare. Kurunegala; Trincomalie (Ferguson). Var. β, Kalpitiya (Trimen, Aug. 1833). Fl. July–Dec.

Also in India, Trop. Asia generally, and N. Australia.

The specimens of var. β are in too imperfect a state for satisfactory determination. Its reference to *F. bispicata* is by Dr. Trimen. Clarke, in Fl. B. Ind., refers *bispicata* as a synonym to *schœnoides*. The description is from Trimen's specimens.

6. **F. dichotoma,** *Vahl, Enum.* ii. 287 (1806).

*Scirpus dichotomus*, L., var., Retz. Obs. iv. 12. *F. pallescens*, Nees; Thw. Enum. 348. Trim. Syst. Cat. Ceyl. 101. C. P. 3758.

Fl. B. Ind. vi. 635. Rottb. Descr. and Ic. t. 13, f. 1 (*Scirpus*).

Annual, root-fibres capillary; stems 2–10 in., densely tufted, filiform, grooved, smooth; l. shorter than the stems, very narrow, $\frac{1}{40}$ in., tapering to a fine point, quite smooth, sheath puberulous or pilose; umbel laxly compound or decompound, 1–2 in. diam., rays few or many, up to 1 in., suberect; bracts filiform, shorter or longer than the umbels; spikelets $\frac{1}{8}$–$\frac{1}{5}$ in., solitary on the rays, ovoid, subangular, many-fld., pedicels $\frac{1}{4}$–$\frac{1}{2}$ in., rarely more, erect or spreading, lowest glume more or less bracteiform, glabrous or puberulous, rhachilla stout, angular, covered with large pits; glumes loosely imbricate, all, or all but the lowest, fertile, lower $\frac{1}{15}$ in., broadly ovate,

upper $\frac{1}{10}$ in., oblong-ovate, all shortly cuspidate, red-brown, strongly keeled, keel 1–3-veined, green; stam. 1–3, anth. small, obtuse; nut $\frac{1}{50}$ in., broadly obovate or subcordate, minutely stipitate, compressed, biconvex, with 6–9 low broad trabeculate ribs, pale straw-col'd., style twice as long, copiously villous above the middle, base wilh a small globose bulb, stigmas 2.

Low country; apparently rather rare. Dumbara; Uva Prov.
Throughout warm regions of Old World.
Often confused with *F. diphylla*, which is normally perennial.

7. **F. æstivalis,** *Vahl, Enum.* ii. 288 (1806).
*Scirpus æstivalis*, Retz. Obs. iv. 12. Trim. Syst. Cat. Ceyl. 101 (excl. syn.). C. P. 3943 (in part).
Fl. B. Ind. vi. 637 (in part).

A dwarf, densely tufted annual, root-fibres capillary; stem 2–6 in., filiform, grooved, smooth; l. shorter than the stem, almost filiform, $\frac{1}{40}$ in. broad or less, sparsely hairy, sheath pubescent, open; umbel compound or decompound, 1–1$\frac{1}{2}$ in. broad, rays many, spreading, short, filiform; bracts short, rarely exceeding the umbel, glabrous or pubescent; spikelets $\frac{1}{6}$–$\frac{1}{4}$ in., rather crowded, linear-oblong, $\frac{1}{12}$ in. diam., dark brown, subsquarrose, 1 or 2 lowest glumes longest, with an hispidulous keel, rhachilla slender, prominently scarred; glumes laxly imbricate, all, even the lowest fertile, $\frac{1}{20}$ in. long, recurved, oblong, cuspidate, cusp $\frac{1}{3}$–$\frac{1}{4}$ the length of the glume, 1-veined, keeled; stam. 1, anth. very small; nut $\frac{1}{60}$ in. long, obovate, smooth, much compressed, biconvex, base subacute, margins acute, pale straw-col'd., style twice as long as the nut, nearly glabrous, bulbous base naked, stigmas 2.

Ceylon (Kœnig in Herb. Mus. Brit.). Also collected at Colombo, first by Ferguson in 1867, but, doubtless, occurs elsewhere. Fl. April (?).
Southern India (?).

Clarke considers this as identical with a very widely distributed Indian, Malayan, and Australian plant, which is Wallich's 3516 A and 3517 B, D, E. I, on the other hand, regard it as a distinct and local plant, first found in Ceylon by Kœnig, and of which there are, as Mr. Rendle informs me, specimens in the British Museum. It is certainly the *F. æstivalis* of Wight's Catalogue, No. 1880, where Wallich's 3516 A and 3517 C are erroneously cited as conspecific. The latter, a widely distributed Indian, Malayan, and Australian species, not hitherto found in Ceylon, is a taller, more slender plant, with looser umbels, smaller spikes, shorter cusps of the glumes, which have never a squarrose appearance, and a short tip of the nut. It more nearly resembles *F. Trimeni*, and is *F. trichoides*, Miquel, Fl. Ind. Bat. iii. 319, and *F. Griffithiana*, Steud. Syn. Cyp. 110, both published in 1855. *F. Griffithii*, Boeck. in Flora, xliii. 241 (1860). There is no habitat given with Wight's specimen, which, like a good many others of his unlocalised plants, is probably from Ceylon.—J. D. H.

8. **F. Trimeni,** *Hook. f.*

*F. æstivalis*, var. *major*, Trim. Syst. Cat. Ceyl. Pl. 101. C. P. 3943 (in part).

A dwarf, densely tufted annual, root-fibres capillary; stem 3–6 in., filiform, grooved; l. shorter than the stem, very narrow, flat, $\frac{1}{25}$–$\frac{1}{20}$ in. broad, sheath short, open, glabrous or pubescent; umbel simple or compound, 1–1$\frac{1}{2}$ in. broad, rays few or many, $\frac{1}{2}$–$\frac{3}{4}$ in. long, filiform, spreading, bearing few remote pedicelled spikelets; bracts capillary, much shorter than the rays; spikelets, loosely corymbose, $\frac{1}{7}$–$\frac{1}{3}$ in. long, narrowly ovoid or oblong, acute, terete or obscurely angled, many-fld., pale brown, lowest glumes narrower, longer, cuspidate, often bracteiform, keel hispidulous, rhachilla slender, pitted; glumes closely imbricate, $\frac{1}{12}$–$\frac{1}{10}$ in., nearly straight, oblong, 1-veined, cuspidate, cusp not $\frac{1}{6}$ the length of the glume, green, sides hyaline; stam. 1–2, with rather short anth.; nut $\frac{1}{30}$ in., stoutly stipitate, orbicular, obovoid or subglobose, turgidly biconvex, margins rounded, smooth, pale straw-col'd., style rather longer than the nut, hairy, base bulbous, hispid, stigmas 2, short.

Colombo (Ferguson, April 1867). Growing with *F. æstivalis* (Trimen). Fl. April.

Closely allied to *F. æstivalis*, but umbels larger, laxer, spikelets $\frac{1}{3}$ in. long, narrowly ovoid, not at all squarrose, glumes nearly straight, $\frac{1}{12}$ in., ovate-oblong; nut larger, almost globose, $\frac{1}{40}$ in. diam., style hairy above and with a large hispid bulb.

9. **F. argentea,** *Vahl, Enum.* ii. 294 (1806).

Thw. Enum. 348. C. P. 2877.

Fl. B. Ind. vi. 640. Rottb. Descr. et Ic. t. 17, f. 6 (*Scirpus argenteus*), and t. 14, f. 3 (*S. monander*).

A densely tufted glabrous annual, root-fibres filiform; stems 4–8 in., filiform, trigonous, striated; l. shorter and more slender than the stem, almost capillary, flexuous, smooth, sheath short, quite glabrous; spikelets 3–20, quite sessile, in a terminal globose head, ovoid-oblong or cylindric, obtuse, $\frac{1}{8}$–$\frac{1}{6}$ in. long, $\frac{1}{10}$ in. diam., glabrous, greyish green, rhachilla stout, scarred; bracts 3–4, filiform, 2 or more much longer than the head, up to 3 in., flexuous; glumes closely imbricate, $\frac{1}{20}$ in. long, broadly ovate, acute, not cuspidate, membranous, with a strong green keel from above the middle to the tip, sides hyaline and red-brown; stam. 1, anth. obtuse; nut $\frac{1}{60}$ in., orbicular, shortly stipitate, much compressed, biconvex, margins acute, quite smooth, style twice as long as the nut, very minutely hairy above the middle, base conical, truncate, glabrous, stigmas 2.

Damp places in the low country, mostly in the dry region; rather common. Fl. most of the year.

Also in Peninsular India, Bengal, Malaya, and the Mauritius.

10. **F. ferruginea,** *Vahl, Enum.* ii. 291 (1806).
Thw. Enum. 348. C. P. 848.
Fl. B. Ind. vi. 638.

A densely tufted perennial; rootstock short, root-fibres stout and slender; stem 1–2½ ft., rather stout, subtrigonous, grooved, smooth; l. 0, or few, short, very narrow, glabrous or hairy, lower sheaths coriaceous, split, upper scarious, truncate; umbels simple or subcompound, rays few, usually very short, rarely ½ in. long, stout, spreading; bracts very short, striate, slender; spikelets few, ¼–½ in., oblong-ovoid, terete, somewhat hoary, pale red-brown, rarely bracteolate by a small ovate or lanceolate persistent lowest glume; rhachilla stout, angular, with large pits; glumes laxly imbricate, $\frac{1}{6}$ in. long, orbicular-ovate, cymbiform, minutely cuspidate, chartaceous, recurved, pale brown, keel green; stam. 2–3, anth. very long, $\frac{1}{10}$ in., obtuse; nut stipitate, $\frac{1}{20}$ in. long, broadly obovate or almost obcordate, much compressed, biconvex, quite smooth, yellowish or pale brown, style twice as long as the nut, villous to the slightly dilated truncate base, stigmas 2.

Var. (?) **tenuissima,** *Clarke in Fl. B. Ind.* vi. 639.

'Stem. 16 in., very slender, slightly flattened, l. 1–6, very slender, bracts ½ in., spikelets 1–3, pale, ¼ in. long, glumes nearly glabrous, furnished with obscure round and red glands, nut as in *F. ferruginea.*—This looks like a distinct species, but only known from one sheet of specimens.'—*Clarke, l. c.*

Wet places in the low country, especially in brackish water at mouth of rivers; common. Var. *β*, Trincomalie (Mrs. Marriott in Herb. Delessert). Fl. most seasons.

All hot countries.

I have not seen specimens of var. *β*.—J. D. H.

11. **F. diphylla,** *Vahl, Enum.* ii. 289 (1806).
Herm. Mus. 26. Fl. Zeyl. n. 40. *Scirpus dichotomus,* L. Sp. 50. Thw. Enum. 348. C. P. 839, 840.
Fl. B. Ind. vi. 636.

Rootstock hardly any, or up to 1 in. long, stout, root-fibres rather stout; stem 1–2 ft., slender, angled, grooved, quite smooth; l. as long as the stem or shorter, $\frac{1}{12}$–$\frac{1}{8}$ in. broad, linear, coriaceous, rather rigid, serrulate towards the acute tip, margins scaberulous, striate above, obscurely 2-veined beneath, sheath short, glabrous or pubescent; umbel simple or compound (or spikelets in a compact head), rays not many, very

unequal, up to 2 in. long; bracts filiform, long or short; spikelets scattered or clustered, $\frac{1}{5}$–$\frac{1}{3}$ in. long, ovoid, acute, terete, lowest glumes rarely bractlike, usually small, deciduous, rhachilla stout, scarred and pitted; glumes $\frac{1}{6}$–$\frac{1}{5}$ in., loosely imbricate, broadly ovate, cymbiform, acute, chartaceous, keel obtuse, 3-veined, green, midrib reaching the tip, sides chestnut brown; stam. 1–3, anth. long, tip conical; nut $\frac{1}{25}$ in., broadly or orbicularly obovoid, stipitate, many-ribbed, interstices punctate, pale straw-col'd. or dark brown, style twice as long as the nut, very broad, villous with long spreading or reflexed hairs down to and on the dilated truncate base, stigmas 2.

Var. β, **major,** *Thw. Enum.* 433. *F. rigidula,* Thw. l. c. 348, 433 (non Nees). C. P. 3232.

Stem taller, leaves long, very narrow, spikelets larger up to $\frac{1}{2}$ in., ovoid-oblong.

Var. γ, **ovalis,** *F. ovalis,* Nees in Wight, Contrib. 100. Thw. l. c. 348. C. P. 3737.

Annual or perennial, leaves shorter, more flaccid, hairy, spikelets very variable, $\frac{1}{6}$- nearly $\frac{1}{4}$ in., glumes cuspidate, nut larger up to $\frac{1}{20}$ in. long.

In all parts of the island; very common. Fl. most of the year.
All warm countries.
A very variable plant. The varieties are quite inconstant. 'Hermann's *S. dichotomus* is certainly this.'—*Trimen.*

12. **F. spathacea,** *Roth, Nov. Sp. Pl.* 24 (1821).
*F. Wightiana,* Nees; Thw. Enum. 349. C. P. 3759.
Fl. B. Ind. vi. 640.

Rootstock very short, or elongate, stout, woody, root-fibres both stout and slender, black; stem densely leafy below, $\frac{1}{2}$–$1\frac{1}{2}$ ft., stout, obtusely trigonous, grooved; l. very many, densely crowded on the rootstock, much shorter than the stem, spreading and recurved, narrowly linear, obtuse or acute, up to $\frac{1}{20}$ in. broad, rigidly coriaceous, margins recurved, scaberulous, sheaths short, imbricating, open, coriaceous; umbel simple or compound, open or with the spikelets more or less crowded, sometimes into a globose head, but always pedicelled; bracts very short, rigid, erect, base dilated, coriaceous; spikelets $\frac{1}{10}$–$\frac{1}{5}$ in., ovoid, obtuse, terete, pale brown, lowest glumes usually lanceolate, bracteiform, subpersistent, rhachilla stout, squarrose, pits large; glumes rather laxly imbricate, $\frac{1}{15}$ in. long, broadly ovate or orbicular, cymbiform, tip membranous, obtuse or rounded, all hyaline except for a triangular red-brown area extending from some distance below the tip to the base, keel indistinctly 3–5-veined; stam. 2–3, anth.

obtusely apiculate; nut very variable, $\frac{1}{40}$–$\frac{1}{30}$ in., minutely stipitate, obovate or obcordate, compressed, biconvex, surface slightly uneven, pale, at length nearly black, style shorter or as long as the nut, quite naked, base bulbous or not, stigmas 2, longer than the style.

Sands of the seashore, common round the coast. Fl. probably all the year.

India, Malaya, &c.

The spikelets are very frequently densely approximated, and form a rounded head; it is then var. *congesta*, Trim. Syst. Cat. Ceyl. 102, but is connected with the type by intermediates.—*Trimen.*

13. **F. compressa,** *Boeck. in Linnæa,* xxxviii. 558 (1874).
Fl. B. Ind. vi. 639.

Densely tufted, root-fibres slender; stems 12–18 in., very slender, trigonous, grooved; l. few, much shorter than the stem, almost filiform, obtuse, sheaths 2–3 in., tips subulate, margins scarious; umbel compound, of few spreading slender rays 1 in. long, or shorter, carrying few scattered small uniformly dark brown pubescent spikelets; bracts filiform, one about as long as the umbel; spikelets $\frac{1}{5}$–$\frac{1}{3}$ in., ovoid, subacute, terete, pubescent, lowest two glumes long-cuspidate, empty, rhachilla slender, deeply closely pitted, not winged; glumes closely imbricate, $\frac{1}{10}$ in. long, broadly ovate, cymbiform, acute, apiculate, 1-veined, uniformly covered with dark brown points and thickly puberulous, keel slender; stam. 1, anth. rather short, obtuse; nut $\frac{1}{30}$ in., obcordate, strongly compressed, biconvex, quite smooth, straw-col'd., at length brown, style not longer than the nut, slender, glabrous, base swollen, stigmas 2, short.

Periakulam, near Trincomalie (W. Ferguson, 1885). Fl. Dec.

Madras, Burma.

The only Ceylon species with all the glumes pubescent.

14. **F. quinquangularis,** *Kunth, Enum.* ii. 229 (1837).
Thw. Enum. 349. C. P. 838.
Fl. B. Ind. vi. 644.

Annual, tufted, glabrous, leafy, root-fibres slender; stem $\frac{1}{2}$–2 ft., slender, obtusely angled, deeply grooved; l. longer or shorter than the stem, very slender, $\frac{1}{10}$ in. broad or less, linear, finely acuminate, flaccid, margins and keel scaberulous, sheaths long, subdistichous, green, coriaceous; umbel decompound, rays very many, suberect, filiform, much branched, bearing innumerable very small pedicelled spikelets, whole infl. appearing like one oblong panicle; bracts filiform, usually shorter than the umbel; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., ovoid, terete, pale brown, rhachilla winged; glumes rather laxly imbricate, $\frac{1}{16}$ in. long, orbicular-ovate, cymbiform, membranous, mucronate by the

excurrent 3-veined keel, sides hyalines; stam. 3, anth. obtuse; nut shortly stipitate, $\frac{1}{40}$ in. long, obovoid, obtusely trigonous, tubercled, pale, style as long as the nut, more or less villous, stigmas 3, longer than the style.

Low country in grass; common. Peradeniya. Fl. most seasons.

Also in India, China, Malaya, Australia.

A very variable plant in India, in stature, foliage, and infl. The description is taken from Ceylon specimens (C. P. 838). Clarke, who retains it in Fl. B. Ind. as a species, cites Arnott's authority for its being hardly separable from *F. miliacea.* Of Clarke's var. *crassa* (Fl. B. Ind. vi. 644), differing in its slender habit, woody rootstock, and rather larger ellipsoid spikelets, I find no Ceylon specimen in Herb. Peraden., Brit. Mus., or Kew, nor can Mr. Clarke refer me to any. It is the *F. globulosa,* var. *aphylla* of Miquel, and may possibly be that plant.—J. D. H.

15. **F. miliacea,** *Vahl, Enum.* ii. 287 (1806). **Mudu-halpan,** *S.* *Scirpus miliaceus,* Burm.; Moon, Cat. 6. *Trichelostylis miliacea,* Nees in Wight, Contrib. 103. Thw. Enum. 348. C. P. 836.

Fl. B. Ind. vi. 644. Burm. Fl. Ind. t. 9, f. 2. Rottb. Descr. et Ic. t. 5, f. 2.

Annual, tufted, glabrous, leafy, root-fibres slender; stem 6–24 in., slender, below obtusely angled, triquetrous above; l. shorter than the stem, very slender, $\frac{1}{10}$ in. broad or less, linear, tapering to a firm point, margins nearly smooth, sheaths subdistichous, margins scarious; umbel decompound, rays suberect or spreading, filiform, bearing very many scattered very small pedicelled spikelets; bracts filiform or capillary, much shorter than the umbels; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., ovoid or globose, terete, obtuse, pale or dark brown, rhachilla stout, naked, pitted; glumes not numerous, closely imbricate, $\frac{1}{20}$ in. long, orbicular-ovate, cymbiform, obtuse; membranous, keel obscurely veined, reaching the tip, but not excurrent; stam. 1–3, anth. obtuse; nut minutely stipitate, $\frac{1}{40}$ in. long, obovoid, obtusely trigonous, white pale or brownish, tubercled, style about as long as the nut, glabrous, base globose, stigmas 3, about as long as the style.

Var. **congesta,** *Trim.* MSS.

Stems 3–6 in., stout, triquetrous throughout, umbels reduced to globose entire or lobed terminal heads of sessile compacted spikelets, with rarely a ray terminated by another smaller head.

In the water of paddy fields, &c.; common. Var. *congesta,* Peradeniya. Fl. all the year.

All hot countries.

Very closely allied to *F. quinquangularis,* having similar l. and spikelets, but the glumes are not mucronate, are less keeled, the rachilla is not winged, and the style is quite glabrous.

16. **F. globulosa,** *Kunth, Enum.* ii. 231 (1837). **Hal-pan,*** *S.*
*Scirpus globosus*, Moon, Cat. 6. *Trichelostylis globulosa*, Nees in Wight, Contrib. 105. Thw. Enum. 349. C. P. 842.
Fl. B. Ind. vi. 644.

Rootstock short, stout, horizontal, root-fibres stout; stem 6–18 in., rather stout, terete or compressed below, trigonous or 4–5-angled above, angles smooth; l. 0, sheaths 1–6 in., obtuse, appressed, with narrow scarious brown margins, rarely bearing a short limb, mouth very obliquely truncate; umbels small, simple or compound, rays few, rather stout, $\frac{1}{2}$–$2\frac{1}{2}$ in., erect or spreading, bearing few distant long- and short-pedicelled spikelets; bracts very short, subulate; spikelets $\frac{1}{5}$–$\frac{1}{4}$ in., ovoid and obtuse, or globose, terete, pale brown, lowest empty glumes very small, narrow, persistent or deciduous, rhachilla stout, squarrose; glumes closely imbricate, $\frac{1}{12}$ in. long, oblong, cymbiform, broadly hyaline all round, dorsally convex, keel obscurely 3-veined, vanishing far below the rounded tip; stam. 2–3, anth. rather stout, obtuse; nut $\frac{1}{30}$ in., globosely obovoid, obtusely trigonous, obscurely striate and subtubercled, pale brown, style as long as the nut, glabrous, base subpyramidal, stigmas 3.

In water, moist low country; common. Fl. most seasons.
India, Malaya, Polynesia.

17. **F. insignis,** *Thw. Enum.* 349 (1864).
Thw. Enum. 433. *F. Thwaitesii*, Boeck. in Linnæa, xxvii. 34. C. P. 3317.
Fl. B. Ind. vi. 645.

Rootstock very short, with wiry root-fibres; stems 8–24 in., slender, subtrigonous, deeply grooved, smooth; l. crowded on the rootstock, much shorter than the stem, 3–7 by $\frac{1}{6}$ in. or narrower, flat, rigid, tip rounded denticulate, margin very narrowly recurved, smooth or scaberulous, opaque on both surfaces, midrib beneath flat, sheath very short, coriaceous, open; umbel subsimple, of 3–5 trigonous stiff rays 1–3 in. long, each bearing 1–3 large spikelets; bracts $\frac{1}{4}$–$\frac{1}{2}$ in., subulate, erect; spikelets $\frac{1}{2}$–1 in. by $\frac{1}{6}$–$\frac{1}{5}$ in. diam., oblong-lanceolate, acute at both ends, terete, brown, lowest 2 glumes small, long-cuspidate, empty, rhachilla stout, clothed with imbricating wings; glumes closely imbricate, $\frac{1}{4}$ in. long, oblong, subacute, cymbiform, cuspidate, coriaceous, keel slender, veins 0; stam. 3, anth. very long, slender, tip conical; nut hardly stipitate, $\frac{1}{25}$ in. long, broadly obcordate, trigonous, subtubercled, faces concave, pale, style three times as long as the nut, slender, sparsely villous, thickened base elongate, stigmas 3, rather short.

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* See also *Cyperus Haspan*, p. 26.

Moist low country; rather rare. Near Colombo; Pasdun Korale; between Negombo and Kurunegala (Thwaites). There are specimens in Herb. Mus. Brit. from Moon, collected near Kalutara. Fl. Feb., Aug.

Borneo, China.

18. **F. leptoclada,** *Benth. Fl. Hongk.* 393 (1861).
*F. retusa*, Thw. Enum. 349. C. P. 3760.
Fl. B. Ind. vi. 647.

Rootstock small, many-leaved, root-fibres capillary; stems 6–24 in., densely tufted, very slender, almost filiform, angular, grooved; l. shorter than the stem, 3–12 in., very narrow, $\frac{1}{15}$ in. broad or less, obtuse, flat, margins smooth, sheath 2–4 in., upper ending in leaves, margins not scarious; umbel sub-compound, contracted, subcapitate, $\frac{1}{2}$–$\frac{2}{3}$ in. diam., of few, short rays, bearing dense clusters of small sessile dark brown spikelets; bracts rarely longer than the umbel; spikelets $\frac{1}{6}$–$\frac{1}{5}$ in., shortly oblong or ovoid, obtuse, terete, many-fld., sub-pruinose, 2 lowest glumes like the upper, but empty, rhachilla slender, deeply pitted, wings caducous; glumes closely imbricate, $\frac{1}{16}$ in. long, broadly oblong, tip broad, rounded, hyaline, emarginate or 2-lobed, deeply keeled, sides appressed, punctate, keel not reaching the tip, veins obscure; stam. 1, anth. rather short, apiculate; nut $\frac{1}{30}$ in. long, obovoid, trigonous, verrucose, pale, at length dark grey, style as long as the nut, stout, glabrous, base tumid, stigmas 3, longer than the style.

Moist low country; rather common. Galle; Colombo; Pasdun and Reigam Korales, &c. Fl.

Also Malacca, Borneo, S. China.

19. **F. asperrima,** *Boeck. in Linnæa*, xxxvii. 40 (1871).
*F. chætorrhiza*, Thw. Enum. 349 (part). C. P. 837 (part).
Fl. B. Ind. vi. 643.

Rootstock stout, horizontal, woody, root-fibres stout; stem $1\frac{1}{2}$–3 ft., slender, trigonous or plano-convex, smooth or angles scabrous towards the top, deeply grooved; l. many, radical, 6 in. to 2 ft. long, $\frac{1}{10}$–$\frac{1}{5}$ in. broad, acute, flat, coriaceous, margins scabrid, sheaths short, open, brown, margins of upper scarious; umbel effuse, compound, loosely umbellulate, primary rays up to 3 in. long, spreading, secondary bearing many small pedicelled spikelets; bracts very long, up to 10 in.; spikelets scattered, $\frac{1}{5}$–$\frac{1}{4}$ in. long, oblong or ovoid, angular, obtuse or acute, pale brown, few-fld., lowest glume not bracteiform, rhachilla winged; glumes $\frac{1}{10}$ in. long, broadly ovate, cymbiform, acute, mucronate by the green excurrent, 3–5-veined keel, margins broadly hyaline, in a mature state the red-brown basal portions on each side of the midrib separate, and are deciduous or adhere to the rhachilla, the glume then presents a lunate base on each side of the keel; stam. 3, anth. with a

short conical tip; nut $\frac{1}{25}$ in. long, obovoid, narrowed towards the top, obtusely trigonous, coarsely tubercled, pale, style rather longer than the nut, nearly glabrous, base conical, stigmas 3, slender.

Low country in grass; very common.

Also in Malaya generally.

Resembles *F. junciformis* (of which a specimen is included in the sheet of *asperrima* in Herb. Perad.) in size and colour of spikelets, but the great bracts at once distinguish it, as do the absence of distichous glumes, the crossly tubercled nut, and long, smooth style.

20. **F. tristachya,** *Thw. Enum.* 434 (1864).
*Schœnus cyperoides*, Retz. Obs. Bot. iv. 8. *Abildgaardia tristachya*, Vahl; Thw. Enum. 347. C. P. 852.
Fl. B. Ind. vi. 649.

Rootstock stout, woody, many-leaved, root-fibres very stout; stem 12–24 in., rather stout, obtusely angled and deeply grooved; l. crowded at the base of the stem, much shorter and more slender than this, 6–12 in., erect and curved, rigid, concave above, acute, margins smooth or scaberulous, sheaths very short, rigid, margins scarious; umbel of 2–3 spikelets, one sessile and one or two on rigid pedicels 1–1$\frac{1}{2}$ in. long, compressed; bracts $\frac{1}{6}$–$\frac{1}{2}$ in., suberect, strict; spikelets $\frac{1}{2}$–1 in., subcompressed, ovoid, acute, pale yellowish, lower glumes distichous, lowest small, subulate, empty, upper subspirally twisted, rhachilla slender, wings caducous, glumes $\frac{1}{4}$–$\frac{1}{3}$ in. long, broadly ovate, cuspidate, faintly many-veined towards the centre, dorsally rounded with an acute keel, margins not hyaline; stam. 3, anth. slender, subacute; nut $\frac{1}{8}$ in. long, globosely trigonous, suddenly narrowed into a stout cylindric stipes, 3-ribbed, tuberculate, pale, at length dark brown, style twice as long as the nut, flattened, pubescent, base slightly dilated, stigmas 3, short.

Damp ground near the sea in the dry region; rather common. Jaffna; Chilaw; Kalpitiya; Trincomalie.

Also in Peninsular India and Africa.

First collected by Kœnig.

21. **F. monostachya,** *Hassk. Pl. Jav. Rar.* 61 (1848).
*Abildgaardia monostachya*, Vahl; Thw. Enum. 347 and 434. C. P. 3231.
Fl. B. Ind. vi. 649. Rottb. Descr. et Ic. t. 13, f. 3 (*Cyperus monostachyus*).

Annual (?) densely tufted and leafy, root-fibres slender; stems 6–12 in., very slender or filiform, striate; l. crowded on the swollen base of the stem, filiform or nearly so, but flat, acute or acuminate, sheath short, margins scarious; spikelets solitary on the stem, very rarely 2, variable in size, $\frac{1}{5}$–$\frac{1}{2}$ in. by $\frac{1}{6}$–$\frac{1}{4}$ broad, compressed, ovate, shining, pale straw-col'd., 2

lowest glumes longer, cuspidate, empty, rhachilla slender, wings persistent; glumes loosely imbricate, subdistichous, coriaceous, triangular-ovate, acute, cuspidate, keel slender, margins not hyaline; stam. 3, anth. long, subacute; nut $\frac{1}{12}$ in., globosely pyriform, narrowed into a stout stipes, trigonous, 3-ribbed, tubercled, straw-col'd., style not twice as long as the nut, stout, pubescent, down to and on the bulbous base, stigmas 3, short.

In grass in the low country; common. Fl. in most months.
In all hot countries.

22. **F. pentaptera,** *Kunth, Enum.* ii. 229 (1837).
*Trichelostylis pentaptera*, Nees in Wight, Contrib. 105. *F. Salbundia*, Thw. Enum. 349 (non Kunth). C. P. 823, 843.
Fl. B. Ind. vi. 645.

Rootstock shortly creeping, woody, root-fibres stout; stems 2–5 ft., slender, triquetrous, deeply grooved, leafless, glabrous or pilose; l. 0, or in separate shoots, or in young plants very slender, pilose sheaths of the flg. stems 2–6 in. long, mouth and sides broadly scarious, sometimes produced into a scarious flaccid limb; umbels small, compound, 1–3 in. long and broad, open, rays 3–10, slender, with many solitary, pedicelled, dark brown spikelets; bracts very small, subulate; spikelets $\frac{1}{7}$–$\frac{1}{4}$ in., compressed, trigonous, oblong or ovate-oblong, few-fld.; lowest empty glumes cuspidate, rhachilla stout, wings persistent; glumes distichous on one face of the spikelet, $\frac{1}{8}$–$\frac{1}{7}$ in. long, broadly ovate, subacute, keel reaching the tip but hardly excurrent, margins very narrowly hyaline; stam. 2–3, anth. long, narrow; nut $\frac{1}{20}$–$\frac{1}{18}$ in., stipitate, globose or globosely obovoid, pale or dark brown, surface uneven, style rather longer than the nut, glabrous, base conical, stigmas as long as the style.

Patanas of the montane zone, 4–7000 ft.; common.
Also in S. India.
There are in Herb. Peraden., in the cover with *F. cinnamometorum*, specimens of this, or of a closely allied species, with smaller spikelets, mucronate glumes, a nut only $\frac{1}{30}$ in. long, and 2 occasionally bipartite, filiform stigmas.

23. **F. monticola,** *Steud. Syn. Cyp.* 111 (1855).
*F. tenuifolia*, Thw. Enum. 434. C. P. 3780, 851 (in part).
Fl. B. Ind. vi. 642.

Very slender, leafy, densely tufted, root-fibres filiform; stems 6–12 in., erect, filiform, obtusely trigonous, striate, flexuous; l. many at the base of the stem, shorter or nearly as long as the stem and as slender or more so, acute, concave, dorsally rounded, strongly ribbed, margins distantly scabrid,

sheath short, membranous; umbel subsimple, or subcompound, rays 2–4, with 1 or 2 spikelets on each, $\frac{1}{4}$–$\frac{1}{2}$ in., filiform, spreading or recurved; bracts very short, setiform; spikelets $\frac{1}{4}$–$\frac{1}{3}$ in., ovoid or oblong-ovoid, obtuse or acute, flattened, dark brown, lowest glumes very small, deciduous, rhachilla squarrose, pits large with hyaline margins; glumes laxly subdistichously imbricate, $\frac{1}{10}$ in. long, orbicular-ovate, apiculate, coriaceous with broad hyaline margins, keel 3-veined, dark brown, percurrent; stam. 3, anth. with an acute tip; nut stipitate, globosely obovoid, obtusely trigonous, $\frac{1}{25}$ in. long, minutely tubercled and sometimes echinulate here and there, style rather longer than the nut, more or less villous to the swollen base, stigmas 3.

Lower montane zone; rare. Ambagamuwa; Kelebokka.

Also in hills of S. India.

Clarke (Fl. B. Ind. l. c.) describes the nut as acutely trigonous, with the outermost cells in 12–13 irregular vertical series, and places the species in section *Trichelostylis;* but the lower glumes of the spikelets are clearly distichous in the Ceylon plant.

24. **F. cinnamometorum,** *Kunth, Enum.* ii. 229 (1837).

*Scirpus cinnamometorum*, Vahl, Enum. ii. 278. Moon, Cat. 6. *Abildgaardia cinnamometorum*, Thw. Enum. 347. *F. cyperoides*, Br.; Trim. Syst. Cat. 101. C. P. 2752.

Fl. B. Ind. vi. 650 (*F. cyperoides*, var.).

Densely tufted, rootstock small, hard, root-fibres filiform; stem 6–24 in., very slender, leafy, subterete, striate; l. many at the base of the stem, filiform, flexuous, mostly shorter than the stem, and even more slender, flexuous, grooved along the middle, sheath coriaceous with scarious margins; umbel decompound, 1–3 in. broad, very lax and open, rays few, capillary, spreading, bearing many distant spreading pedicelled small brown spikelets; bracts much shorter than the umbel, one filiform, the rest subulate; spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., oblong or linear-oblong, much compressed, few-fld., lower glumes distichous, 3 lowest smaller, empty, rhachilla not winged, nodes angular; glumes oblong-ovate, $\frac{1}{8}$–$\frac{1}{7}$ in., obtuse, membranous, sides scabrid, margins pale, keel slender, vanishing below the tip, veins 0; stam. 3, anth. very slender, tip setaceous; nut $\frac{1}{30}$ in., minutely stipitate, narrowly obovoid, trigonous, striate, pale, style 3–4 times as long as the nut, very slender, glabrous, base conical, stigmas 3, short.

Wet places, as paddy fields, in the low country; rather common. Kalutara; Ratnapura; Hewaheta; Ramboda; Henantagola; patanas of Uva and the Central Provinces, up to 5000 ft. (Pearson).

Also in Burma and China.

Clarke, following Bentham and others, regards *F. cinnamometorum* as a variety of the *F. cyperoides*, Br. of Australia and the Philippines,

and I can find no other difference between the two species than that the Ceylon plant is an annual, whereas the Australian is a perennial, with a creeping rootstock. Both are conspicuous by the scabrid glumes, which scabridity Clarke describes as glandular. I follow Trimen, who, however, in keeping up *cinnamometorum* in the list of species prepared for this work, observes that it may be a variety of *cyperoides*.

25. **F. fulvescens,** *Thw. Enum.* 434 (1864).
*Abildgaardia fulvescens*, Thw. Enum. 347. *F. fusca*, Trim. Syst. Cat. 101 (? Nees). C. P. 679.
Fl. B. Ind. vi. 650.

Annual; densely tufted and leafy, root-fibres stout and slender, black; stem 6–18 in., slender, deeply grooved; l. very many, crowded, much shorter than the stem, erect and recurved, linear, obtuse, flat, $\frac{1}{8}$ in. broad or narrower, coriaceous, tip triangular, acute, margins scabrid, sheaths very short, open, coriaceous; umbel 1–2 in. diam., subsimple, rays 3–5, $\frac{1}{2}$–1 in., slender, each with 1–3 long-pedicelled brown spikelets; bracts very short, stiff, subulate, scabrid; spikelets $1\frac{1}{4}$–$\frac{1}{2}$ in., flattened, ovate or oblong, acute, glabrous or puberulous, lowest 2 glumes narrowest, cuspidate, empty, rhachilla slender, wings caducous; glumes all distichous, $\frac{1}{5}$–$\frac{1}{7}$ in., coriaceous, broadly triangular-ovate, acute, apiculate, ciliolate, keel nearly straight, slender, scaberulous, margins not hyaline; stam. 3, anth. very narrow, acute; nut minutely stipitate, $\frac{1}{30}$ in. long, globosely obovoid, trigonous, subtubercled, style very long, slender, glabrous, base bulbous, stigmas 3, short.

Low country; rather rare. Reigam Korale (Thwaites); Hantane; Matale; Doluwa Kande.
Endemic.
Very near *F. fusca*, Nees, of Burma and Malaya, differing in the broader spikelets with longer pedicels and glabrous glumes, which are as distichous as those of a *Cyperus*.

26. **F. nigrobrunnea,** *Thw. Enum.* 434 (1864).
C. P. 3779.
Fl. B. Ind. vi. 648.

Rootstock short, hard, densely leafy, root-fibres wiry; stem 6–24 in., slender, trigonous and deeply grooved, smooth or subscaberulous; l. very many, much shorter than the stem, 3–18 in. long, by $\frac{1}{6}$ in. broad or narrower, erect and recurved, coriaceous, linear, tip rounded or triangular and acute, margins smooth, sheaths open, coriaceous, lower dark brown, shining; umbel simple or compound, rays 3–6, $\frac{1}{2}$–2 in., slender, bearing few or many rather distant brown, glabrous spikelets; bracts very short, rigid, erect; spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., compressed, ovoid or oblong, few- or many-fld., lower glumes

distichous, upper not; rhachilla slender, wings caducous; glumes $\frac{1}{6}$–$\frac{1}{8}$ in., coriaceous, triangular-ovate, cuspidate, keel slender, margins not hyaline; stam. 3, anth. long, slender, tip subulate; nut $\frac{1}{25}$ in. long, turgidly obovoid, trigonous, faintly warted, angles rounded, pale yellow-brown, style not twice as long as the nut, base bulbous, stigmas 3, very slender.

Low country; rather rare. Lagalla (Brodie); Hewesse and Hiniduma, abundant (Thwaites); Ratnapura. Marshes in the Western and Central Province, up to 5600 ft., and dry patanas in Uva, 2500–4400 ft. (Pearson). Fl. Aug., Sept.
Eastern and Southern India, Cambodia.

27. **F. complanata,** *Link, Hort. Berol.* i. 292 (1827).
Thw. Enum. 349, 433. C. P. 3220.
Fl. B. Ind. vi. 646.

Rootstock small, hard, creeping, leafy, root-fibres wiry; stem 2–3 ft., flattened, 2-edged, $\frac{1}{6}$ in. broad or less, deeply furrowed and ribbed, quite smooth; l. very many, crowded round the base of the stem, and shorter than it, erect, linear, up to $\frac{1}{4}$ in. broad, coriaceous, tip obliquely narrowed, obtuse or subacute, margins scaberulous, sheath coriaceous, margins scarious; umbel decompound, effuse, 1–3 in. broad, rays few or many, flattened, loosely corymbosely branched, branches bearing many small, shortly pedicelled, brown spikelets; bracts one-half as long as the umbel, one leaf-like, erect, the rest subulate; spikelets $\frac{1}{6}$–$\frac{1}{4}$ in., oblong or ovoid-oblong, few-fld., lower glumes more or less distichous, lowest narrower, subulate or cuspidate, empty, rhachilla short, wings deciduous; glumes $\frac{1}{8}$ in., oblong, obtuse, mucronate, sides appressed together, dark brown with a deep acute pale keel, margins not hyaline; stam. 3, anth. very long, obtuse; nut $\frac{1}{30}$ in. long, stipitate, turgidly obovoid, 3-gonous, minutely warted, pale, style twice as long as the nut, slender, glabrous, base conical, stigmas 3, long (in one specimen the nut very compressed and stigmas 2.)

Moist low country; common. Maturata; N. Eliya; Kelebokka.
In all hot countries.

28. **F. Kraussiana,** *Hochst. in Flora,* xxviii. 757 (1845).
*F. connectens,* Thw. Enum. 349 and 433. C. P. 2967.
*F. complanata,* var. *Kraussiana,* Clarke in Fl. B. Ind. vi. 646.

Rootstock woody, creeping, root-fibres stout, wiry; stem 8–18 in., many-leaved at the base, slender, trigonous, compressed, striate; l. shorter than the stem, from almost filiform to $\frac{1}{8}$ in. broad, erect, acute, striated and 1-veined beneath, margins obscurely scaberulous, incurved, sheaths with scarious

margins; umbels small, subsimple, 1–2 in. broad, rays few, $\frac{1}{4}$–$1\frac{1}{2}$ in., bearing terminal fascicles of 3–8, sessile or very shortly pedicelled, small, dark brown, opaque spikelets; bracts several, erect, one linear very rarely longer than the umbel, the rest very short, subulate; spikelets $\frac{1}{4}$–$\frac{1}{3}$ in., oblong or linear-oblong, compressed, red-brown, lower on one face distichous, lowest 2 small, empty, cuspidate, rhachilla short, wings caducous; glumes $\frac{1}{8}$ in., broadly oblong, tip rounded, not mucronate, keel obtuse, smooth or scaberulous, vanishing beneath the tip, margins subhyaline; stam. 3, anth. slender, subacute; nut $\frac{1}{25}$ in. long, trigonously obovoid, 3-ribbed, very obscurely warted or quite smooth, pale straw-col'd., style slender, longer than the nut, glabrous, base conical, stigmas 3, slender.

Montane zone above 4000 ft. Maturata and Nuwara Eliya. Mansa Kelle, Kelebokka (Ferguson). Horton Plains, 7200 ft. (Pearson). Fl. Aug.

China, Malaya, Africa.

Differs from *F. complanata*, in the rounded tips of the flowering glumes, which are not mucronate, and the trigonous stem. Clarke perhaps rightly reduces it to a var. of *complanata.* Thwaites regarded it as distinct. Trimen, from a note, appeared to be doubtful.

29. **F. junciformis,** *Kunth, Enum.* ii. 239 (1837).
*F. chætorrhiza,* Kunth, Thw. Enum. 349 (part). C. P. 970, 837 (part). Fl. B. Ind. vi. 647.

Rootstock stout, woody, short or creeping, many-leaved, root-fibres stout, wiry; stem 4–18 in., tufted, rigid, 4–5 angled or compressed, deeply grooved; l. crowded round the base of the stem, short, 2–4 in., spreading and recurved, linear, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, flat, coriaceous, tip triangular, acute, margins scaberulous, sheath very short, coriaceous; umbel compound, rays few, 1–3 in. long, very slender, bearing distant or clustered small chestnut-brown spikelets; bracts 2–4, much shorter than the umbel, erect, rigid; spikelets $\frac{1}{8}$–$\frac{1}{4}$ in., solitary or clustered, oblong or ovoid, few-fld., red-brown, 2 lowest glumes distichous, lowest empty, rhachilla rather stout, wings caducous; glumes $\frac{1}{12}$ in., triangular-ovate, subacute, mucronate, rather membranous, keel slender, margins pale, hyaline; stam. 3, anth. long, acuminate; nut minutely stipitate, $\frac{1}{30}$ in. long, obovoid, trigonous, 3-ribbed, verruculose, white, style larger than the nut, stout, pubescent above, base bulbous, stigmas 3, short.

In grassy places; apparently very common.

Throughout India, Madagascar, Philippine Is.

Clarke (Fl. B. Ind.) has two varieties, natives of S. India and Ceylon, var. *abbreviata* (F. abbreviata, *Boeck.*; F. chætorhiza, *Thw.*), with mostly

solitary spikelets, and var. *latifolia* (F. latifolia, and torta, *Kunth*), with short, flat, curved, and twisted l.

Very closely allied to *F. asperrima*, which is a taller plant, with much larger and broader l., and a large umbel with very long foliaceous bracts. The spikelets of the two are very similar, but none of the glumes of *asperrima* are distichous, and the nut is much larger. A specimen of *junciformis* in Herb. Peraden. is placed under *asperrima* (C. P. 83).—J. D. H.

## 5. ECHINOLYTRUM, *Desv.*

A small, densely tufted, glabrous annual, with capillary root-fibres; l. shorter than the stem, capillary, sheath glabrous; spikelets globose or ovoid, in simple or compound umbels with filiform spreading rays, green; bracts capillary; glumes minute, densely imbricating, squarrosely spreading, oblong, membranous, with a stout midrib, ending in a long stout scaberulous recurved awn as long as itself, very persistent; stam. 1 or 2, anth. linear, subacute; nut linear-oblong, biconvex, straight or slightly incurved, faces quite smooth, sides furnished with a series of few or many stoutly stipitate capitate glands, very rarely naked; style about as long as the nut, filiform, glabrous, base slightly swollen, usually falling away with the style, but sometimes persistent, stigmas 2, capillary. —Monotypic.

**E. dipsaceum,** *Desv. Journ. Bot.* i. 21 (1808).

*Isolepis dipsacea*, R. et S.; Thw. Enum. 350. *Fimbristylis dipsacea*, Benth. ex Clarke in Fl. B. Ind. vi. 635. C. P. 668.

Fl. B. Ind. l. c. Desv. l. c. t. i. Rottb. Descr. et Ic. t. 12, f. 1 (*Scirpus dipsaceus*).

Stem, 3–6 in., striate, green; l. 1–3 in., quite smooth, tip acute; sheath short, not scarious or membranous, umbel 1–2 in. broad, rays few or many, up to 1 in. long, spreading; bracts longer or shorter than the umbel; spikelets globose and $\frac{1}{10}$–$\frac{1}{6}$ in. diam., or shortly oblong and up to $\frac{1}{3}$ in. long by $\frac{1}{8}$ diam., usually setaceously bracteolate; glumes with the awn $\frac{1}{12}$–$\frac{1}{10}$ in.; nut $\frac{1}{40}$–$\frac{1}{30}$ in. long, minutely transversely striate, glands 8–10 on each side, rarely fewer, very rarely 0, each consisting of a spherical head formed of vesicular cells, terminating in a stout tubular stipes; seed loose in the thin coriaceous pericarp.

Damp sandy ground in the low country, especially in the dry region; rather common.

Trop. Asia and Africa.

Very different in habit from any *Fimbristylis*; remarkable for the large stipitate capitate glands of the nut.—J. D. H.

6. **BULBOSTYLIS,** *Kunth.*

Annual; stems very slender, leafy at the base only; l. very narrow, filiform or capillary; spikelets small, crowded in a terminal head, or umbellate; bracts short; glumes few or many, imbricate all round the rhachilla, 1–2 lowest and often the uppermost empty; hypogynous bristles 0; stam. 1–3, anth. linear, obtuse or apiculate; nut obovoid, obtuse, trigonous, smooth, crowned with the style-base; style slender, glabrous, stigmas 3.—Sp. about 70; 4 in. *Fl. B. Ind.*

Mr. Clarke observes that this genus, which has been referred to *Fimbristylis* by Bentham and to *Scirpus* by Boeckeler, is nearer to *Eleocharis*, and may be recognised by its very slender leaves, needle-like hairs, and the peculiar button-like ultimately deciduous style-base crowning the nut.

Glumes cuspidate or mucronate.
L.-sheaths hairy, mouth sparingly bearded . . 1. B. PUBERULA.
L.-sheaths glabrous, mouth copiously bearded . 2. B. BARBATA.
Glumes muticous, tip rounded, membranous . . 3. B. CAPILLARIS.

1. **B. puberula,** *Kunth, Enum.* ii. 213 (see 205) (1837).
*Isolepis gracilis*, Nees; Thw. Enum. 350. *Fimbristylis gracilis*, Trim. Syst. Cat. Ceyl. 102. C. P. 834.
Fl. B. Ind. vi. 653.

A densely tufted annual, nearly glabrous or pubescent, root-fibres capillary; stem 4 to 20 in., filiform, strongly ribbed, glabrous or sparsely pilose with spreading hairs; l. much shorter than the stem, erect, capillary, acuminate, glabrous or puberulous, margins scaberulous, sheaths membranous, hairy, mouth scantily bearded with flexuous hairs; spikelets $\frac{1}{6}$–$\frac{1}{4}$ in., red-brown, densely fascicled in terminal or pseudo-terminal heads, or contracted into small simple or compound umbels with very short rays; heads $\frac{1}{3}$–$\frac{2}{3}$ in. diam., sometimes reduced to 2 or 3 spikelets; bracts setiform; rhachilla slender; glumes $\frac{1}{12}$ in., laxly imbricated, ovate, cymbiform, keel broad, green, often scaberulous, ending in a recurved cusp, sides membranous, puberulous; stam. 1, anth. linear, half as long as the glume; nut broadly obovoid, $\frac{1}{30}$ in. long, pale, trigonous, angles prominent, sides transversely wrinkled, crowned with the minute base of the slender style, stigmas 3.

Low country; common. Fl. Dec., Jan.
Also in India, Malaya, and Trop. Africa.

2. **B. barbata,** *Kunth, Enum.* ii. 208 (1837). **Uru-hiri,** *S.*
Herm. Mus. 45. Burm. Thes. 108. Fl. Zeyl. n. 39. *Scirpus capillaris*, L., Sp. Pl. 49 (part); Moon, Cat. 6. *Isolepis barbata*, Br.; Wight, Contrib. 109; Thw. Enum. 350. *Fimbristylis barbata*, Benth.; Trim. Syst. Cat. 102. C. P. 829.
Fl. B. Ind. vi. 651. Burm. Thes. t. 47, f. 2.

A densely tufted annual, root-fibres capillary; stem 6–18 in., filiform, glabrous, grooved; l. much shorter than the stem, 1–2 in. long, capillary, acuminate, margins involute, scaberulous upwards, sheaths short, membranous, glabrous, with long-bearded mouths; spikelets $\frac{1}{4}$–$\frac{1}{5}$ in., red-brown, densely crowded in a solitary terminal head $\frac{1}{4}$–$\frac{2}{3}$ in. diam., few-fld., rhachilla stout; bracts rarely exceeding the spikelets; glumes $\frac{1}{10}$ in. long, loosely imbricate, ovate, laterally compressed, cymbiform, acute or with the stout acute keel ending in a mucro or cusp, sides thin, puberulous; stam. 1, anth. linear, subacute; nut $\frac{1}{50}$ in., globosely obovoid, trigonous, crowned with the minute base of the style, smooth, angles rounded, style slender, stigmas 3.

Var. **pulchella,** *Clarke*, l. c. *Isolepis pulchella*, Thw. Enum. 350. *Scirpus Thwaitesii*, Boeck. in Linnæa, xxxviii. 330. C. P. 3761.

Stems stouter, bracts longer, up to 1½ in., capillary, flexuous, base often bearded; spikelets shorter, stouter, very pubescent, keel and cusp very stout; lowest glume nearly flat, hyaline, margins often ciliate.

Sandy ground, especially near the sea-coast; very common round the Island. Var. *pulchella*, Kollapituya, Colombo, 1881 (Ferguson). Fl. Feb., May.

Trop. Asia and Africa. Var. *β* confined to Ceylon and Coromandel.

3. **B. capillaris,** *Kunth*, var. **trifida,** *Clarke in Fl. B. Ind.* vi. 652. *Isolepis trifida*, Nees; Thw. Enum. 350. *Fimbristylis trifida*, Trim. Syst. Cat. Ceyl. 102. C. P. 851 (in part).

A densely tufted, glabrous annual, with capillary root-fibres; stem 4–10 in., filiform, strongly ribbed; l. much shorter than the stem, capillary, flexuous, margins involute, quite smooth, sheaths very short, scarious, glabrous or bearded at the mouth; spikelets $\frac{1}{10}$–$\frac{1}{5}$ in., subsolitary, distant on the few short capillary rays of a simple or subcompound umbel, ovate, compressed, red-brown, lowest glumes cuspidate, empty, rhachilla slender; bracts minute, subulate; glumes few, loosely imbricate, $\frac{1}{12}$ in. long, broadly ovate, cymbiform, obtuse, quite glabrous, keel broad, green, vanishing below the rounded tip, margins pale, membranous; stam. 1 or 2, anth. short, tip setaceous; nut $\frac{1}{25}$ in., broadly obovoid or obcordate, tipped with the small black style-base, white, at length greyish brown, minutely striolate and granulate, style about as long as the nut, slender, stigmas 3.

Montane zone; rather common; ascending to 7200 ft. Upper Hewaheta; Ramboda; N. Eliya. Fl. Sept.

Throughout warm regions of Old World.

This var. *trifida* is the Old World representative of the tropical

American *B. capillaris*, which differs in having usually rather larger spikelets, puberulous glumes, and larger nuts. The American or type form does not occur in the Old World.

## 7. ELEOCHARIS, *R. Br.*

Glabrous herbs; stems tufted, simple, erect, embraced below by one or more cylindric, membranous, truncate sheaths; l. 0, rarely a herbaceous or membranous limb on the sheath; infl. a solitary, terminal, ovoid or cylindric, many-fld. spikelet; glumes imbricate all round the rhachilla, membranous or coriaceous, lowest usually empty, bractlike, but not exceeding the spikelet, uppermost empty, the rest bisexual; hypogynous bristles 8, or fewer, rarely 0, retrorsely scabrous or spinulose; stam. 3–1, anth. linear or linear-oblong, not crested, muticous or with an acicular tip; nut plano-convex or trigonous, style-base much swollen, pyriform, conical or depressed, persistent, stigmas 2 or 3, filiform or flattened.—Sp. 130 (reputed); 16 in *Fl. B. Ind.*

Stems usually stout, stoloniferous, or with a creeping rootstock, glumes usually coriaceous.
- Stem septate within.
  - Stem robust . . . . . . . . 1. E. PLANTAGINEA.
  - Stem slender . . . . . . . . 2. E. EQUISETINA.
- Stem not septate within.
  - Bristles as long as the nut.
    - Stem subterete . . . . . . . . 3. E. VARIEGATA.
    - Stem triquetrous above . . . . . 4. E. FISTULOSA.
  - Bristles much shorter than the nut . . 5. E. SPIRALIS.

Stems slender, glumes usually membranous.
- Nut cancellate, 3-ribbed . . . . . . 6. E. CHÆTARIA.
- Nut smooth or striate.
  - Annuals.
    - Spikelets ovoid . . . . . . . 7. E. ATROPURPUREA.
    - Spikelets globose . . . . . . . 8. E. CAPITATA.
  - Perennials.
    - Style-base small . . . . . . . 9. E. CONGESTA.
    - Style-base very large . . . . . 10. E. TETRAQUETRA.

1. **E. plantaginea,** *Br. Prod.* 224 (1810). **Boru-pun,** *S.*
*Scirpus plantagineus*, Retz.; Moon, Cat. 6. Thw. Enum. 352. C. P. 3046.
Fl. B. Ind. vi. 625. Rottb. Descr. et Ic. t. 16, f. 2 (*Scirpus plantaginoides*).

Stem 1–3 ft., densely tufted, stoloniferous, about as thick as a goose-quill, appearing septate when dry, sheath 2–5 in., excessively thin, with a membranous elongate limb, bright red-brown, shining; spikelet 1–1½ in., pale brown or dirty straw-col'd., rather narrower than the stem, rhachilla stout, angled, with irregular, broad, concave facets between the

insertions of the glumes; glumes closely imbricate, $\frac{1}{5}$ in. long, quadrately ovate, truncately rounded at the top, coriaceous, persistent, 1-veined, 1 or 2 lower bracteiform, broadly ovate; bristles 7, equalling or exceeding the nut, retrorsely scabrid, yellow; stam. 3, anth. narrowly linear, tip long, setaceous; nut very small, $\frac{1}{15}$ in. long, orbicular-obovoid, rather compressed, quite smooth, yellowish, style very long, flattened, base triangular, stigmas 3.

In water, moist low country; rather common. Fl. Dec., &c.
Tropics of Old World generally.

2. **E. equisetina,** *Presl, Rel. Haenk.* i. 195 (1830).
*Scirpus plantagineus*, var. *β*, Thw. Enum. 434. C. P. 3777.
Fl. B. Ind. vi. 626.

Stem 12–20 in., tufted, stoloniferous, as thick as a crow-quill or less, deeply grooved, appearing septate when dry, upper sheath 2–3 in. long, with an ovate, acute, appressed limb; spikelet 1–1½ in., straw-col'd., rather broader than the stem; glumes many, $\frac{1}{5}$–$\frac{1}{4}$ in. long, narrowly obovate-oblong, coriaceous, persistent, margins broadly hyaline, mid-vein indistinct; bristles longer than the nut, retrorsely spinulose; anth. with a short conical tip; nut obovoid, somewhat narrowed at the triangular top, style very long, stigmas 3.

Low country; very rare. Kurunegala. Fl. Sept., &c.
Also in Philippine Is. and New Caledonia.
There are no ripe nuts in the Ceylon examples. Two stigmas occur in Indian specimens.

3. **E. variegata,** *Kunth, Enum. Pl.* ii. 153 (1837), var. **laxiflora,** *C. B. Cl. in Fl. B. Ind.* vi. 626.
*Scirpus laxiflorus*, Thw. Enum. 435. C. P. 3762.
Fl. B. Ind. l. c.

Rootstock stout, creeping, root-fibres very stout; stems 1–2 ft., densely tufted, about as thick as a crow-quill, terete or slightly flattened on one side, striate, not septate, upper sheath 2–4 in., with an obliquely truncate acute or rounded discoloured mouth; spikelet 1 in., thicker than the stem, lowest glume bracteiform, rounded, green with a hyaline margin, rhachilla angular with broad concave facets between the glumes; glumes closely imbricate till fruiting, $\frac{1}{5}$ in. long, oblong, obtuse, coriaceous with hyaline tip and margins above, 1-veined, dorsally green, sometimes margined with brown, persistent; bristles 7, longer than the nut, retrorsely scabrid, yellow; tip of anth. short, conical; nut $\frac{1}{16}$ in., nearly orbicular compressed, oval in transverse section, many-ribbed, interstices minutely pitted, yellowish or pale brown, style rather long, base conical, two-thirds as broad as the nut, stigmas 2 or 3.

Moist region up to 4000 ft.; rather rare. Colombo; Ratnapura; Ambagamuwa; Dikoya. Fl April, Sept.

Also in Assam, Malaya, China, Polynesia.

A remarkable plant in Herb. Peraden., from Colombo, with very slender filiform submerged stems, 12–18 in. long, is doubtfully referred to this by Thwaites. It has no flower or fruit, and in foliage resembles a very long-leaved form of *C. Chætaria.*

4. **E. fistulosa,** *Schultes in R. et S. Syst.* ii., *Mant.* 89 (1824).
Thw. Enum. 351. C. P. 3162.
Fl. B. Ind. vi. 626.

Stem 2–3 ft., tufted, stoloniferous, rather stout or slender, $\frac{1}{10}$–$\frac{1}{4}$ in. broad, triquetrous above, compressed, straight, deeply concave on one face, margins of two of the edges waved in stout specimens, sheaths obliquely truncate, delicately membranous, loose, ending in an ovate acute rarely lanceolate hyaline limb; spikelet $\frac{1}{2}$–$1\frac{1}{2}$ in., as broad as the stem or broader, greenish; lowest glumes bracteiform, orbicular, very coriaceous, with membranous margins, rhachilla slender, angular, with broad concave facets between the glumes; glumes $\frac{1}{7}$–$\frac{1}{6}$ in. long, laxly imbricate, broadly oblong, coriaceous, with a broad hyaline border, 1-veined, persistent; bristles 6, as long as the nut or shorter, retrorsely scabrid; anth. long, slender, cells with black tips; nut obovoid or orbicular-obovoid, biconvex, $\frac{1}{18}$ in. broad, faintly striate and transversely striolate, pale or dark brown, style long, dilated base three-fourths of the nut in breadth, stigmas 2 or 3.

In water, in the low country; rather common. Fl. Nov., Dec.
General in the Tropics.

5. **E. spiralis,** *R. Br. Prod.* 224 (1810).
*Scirpus spiralis*, Rottb.; Moon, Cat. 6. *Limnochloa media*, Nees in Wight, Contrib. 114. Thw. Enum. 352. C. P. 853.
Fl. B. Ind. vi. 627. Rottb. Descr. et Ic. t. 15, f. 1 (*Scirpus*).

Stems densely tufted, stoloniferous, 1–2 ft., as thick as a crow-quill, trigonous or biconvex below, triquetrous above, upper sheath with a broad ovate-oblong appressed limb, sometimes $\frac{1}{4}$ in. long; spikelet $\frac{1}{2}$–1 in., thicker than the stem, cylindric, obtuse, pale, lowest glume like the others, but more coriaceous, rhachilla rather stout, terete, very deeply regularly pitted; glumes very many, closely spirally imbricate, quadrate, $\frac{1}{10}$ in. long and broad, membranous, with a clearly defined hyaline upper border, veinless, punctate; bristles much shorter than the nut, scabrid; anth. narrow, cells with discoloured tips; nut globosely obovoid, biconvex, $\frac{1}{20}$ in. diam., margins thickened, faintly striate, dark brown, shining, style long, base dilated, as broad as two-thirds of the nut or more, stigmas 2 or 3.

In water, low country; rather common. Kalutara (Macrae); Trincomalie (Glenie). Fl. March.
Also in India, Burma, and (?) Mauritius.

6. **E. Chætaria,*** *Roem. et Schultes Syst.* ii. 154 (1817).
*Chætocyperus Limnocharis*, Nees in Wight, Contrib. 96. *C. setaceus*, Nees; Thw. Enum. 351. *Scirpus Chætaria*, Thw. Enum. 435. C. P. 247.
Fl. B. Ind. vi. 629.

Annual, densely tufted; stem 1–6 in., filiform or capillary, straight or curved; l. 0, sheaths short, membranous; spikelet $\frac{1}{10}$–$\frac{1}{6}$ in., oval, obtuse, terete or compressed, few-fld., lowest glume $\frac{1}{8}$ in., more than half as long as the spikelet, with three green veins, rhachilla short, internodes narrowly winged; glumes 6–8, subdistichous, loosely imbricate, $\frac{1}{10}$ in. long, oblong, obtuse, membranous, easily detached, faintly 1-veined; bristles as long as the nut or shorter, stout, retrorsely scabrid, sometimes 0; anth. short, linear, obtuse; nut obovoid, $\frac{1}{30}$ in. long, trigonous, cancellate, angles smooth, thickened, produced into short prominences or shoulders below the convex top, pale, opaque, style rather short, base conical, nut contracted at its insertion, stigmas 3, very long.

Moist region, extending rarely into the montane zone; very common. Fl. all the year (?).
Tropics generally.

7. **E. atropurpurea,** *Kunth, Enum. Pl.* ii. 151 (1837).
*Heleocharis multicaulis*, Trim. Syst. Cat. Ceyl. 101 (non Sm.).
Fl. B. Ind. vi. 627.

Annual, densely tufted; stems 2–12 in., very slender, sometimes filiform, straight or curved; l. 0, sheath very short; spikelet $\frac{1}{6}$–$\frac{1}{4}$ in., ovoid, obtuse or acute, much broader than the stem, lowest glumes bracteiform, sometimes half as long as the spikelet, green, with a broad hyaline border, rhachilla slender, with oblong pits; glumes not very numerous, easily detached, loosely imbricate, $\frac{1}{12}$ in. long, membranous, linear-oblong, obtuse, veins 0, red or purplish-brown, with a green centre; bristles slender, scabrid, longer than the nut, white; anth. small, apiculate; nut $\frac{1}{30}$ in. long, broadly ovate or obovoid, contracted at the base and apex, trigonous or biconvex, pale, smooth, style short, base conic or subglobose, truncate, much narrower than the nut, to which it is attached by a mere point, stigmas 2 or 3.

Intermediate region; rare. Kurunegala (?) (Thwaites); Ella, Uva.
Tropics generally, also in Europe.
Thwaites gave no C. P. number to his specimens, which he referred

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* A genus of grasses, a synonym of *Aristida*, to some species of which this plant bears a resemblance.

to *E. gracilis*, R Br. The spikelet is sometimes viviparous, with lateral stems an inch long, proceeding from the axils of the lower glumes. Hypogynous bristles sometimes short or 0 in Indian and other specimens.

8. **E. capitata,** *R. Br. Prod.* 225 (1810).
*Scirpus capitatus*, L.; Moon, Cat. 6. Thw. Enum. 351. C. P. 3039.
Fl. B. Ind. vi. 627. Rottb. Descr. et Ic. t. 15, f. 3 (*Scirpus caribæus*).

Annual; stems densely tufted, 12–14 in., slender, trigonous, sheaths very short, mouth oblique, acute; l. 0; spikelet $\frac{1}{10}$–$\frac{1}{6}$ in., globosely ovoid, top rounded, pale, lowest glume bracteiform, orbicular, green, with a hyaline border; glumes membranous, tightly imbricate, easily detached, orbicular, $\frac{1}{20}$ in. diam., concave, veins 0, rhachilla terete, pitted; bristles as long as the nut or longer, retrorsely scabrid, pale brown; anth. small, linear, obtuse; nut $\frac{1}{40}$–$\frac{1}{30}$ in., obovoid or almost obcordate, biconvex, smooth, dark brown, shining, style short, base pyriform, much narrower than the nut, stigmas 2 or 3.

Low country; common, especially on the sea-coast. Fl. Oct., Dec.
Hot countries generally.

9. **E. congesta,** *D. Don, Prod. Fl. Nep.* 41 (1825).
*E. ovata*, Thw. Enum. 351 (non Br.). C. P. 2635.
Fl. B. Ind. vi. 630.

Stems densely tufted, 8–18 in., slender, subtrigonous, many-grooved, sheaths short, mouth of upper obliquely truncate, with sometimes a small tooth on one side; spikelet $\frac{1}{5}$–$\frac{1}{2}$ in., narrowly ovoid, obtuse, many-fld., lowest glume bracteiform, orbicular; glumes $\frac{1}{10}$ in. long, closely imbricate, membranous, obovate-oblong, obtuse, broadly 1-veined, red-brown, with a broad hyaline green border; bristles much longer than the nut, slender, pale, retrorsely scabrid; anth. obtusely apiculate; nut $\frac{1}{30}$ in. long, obovoid, obtusely trigonous, smooth, pale brown, top contracted, forming a short beak, which is narrower than the truncate base of the short pyriform style-base, style short, stigmas 3, long.

Montane zone; rather common. Ambagamuwa; Dimbula. Fl. Feb.–April.

Also in the mountains of India.

Spikelet often viviparous, as in *E. atropurpurea*, the lower glumes bearing peduncled imperfect spikelets.

10. **E. tetraquetra,** *Nees in Wight, Contrib.* 113 (1834).
Thw. Enum. 351. C. P. 2397.
Fl. B. Ind. vi. 630.

Rootstock elongate, stoloniferous; stems densely tufted, 1–2½ feet, slender, about $\frac{1}{15}$ in. diam., tetraquetrous, deeply grooved, sheaths long, red-brown, upper truncate, with a small tooth-like limb; spikelet $\frac{1}{3}$–$\frac{1}{2}$ in., ovoid, acute, many-fld., lowest glume bracteiform, orbicular-oblong, with 3 green veins

down the middle, rhachilla slender, prominently scarred; glumes loosely imbricate, $\frac{1}{6}$ in. long, oblong or narrowly oblong, obtuse, rather coriaceous, easily detached, tip hyaline; bristles 6, much longer than the nut, stout, densely retrorsely spinulose, red-brown; anth. obtusely apiculate; nut $\frac{1}{10}$ in. long, shortly obovoid, trigonous, base narrowed, smooth, yellowish, style very short, base obpyriform, nearly as broad as the nut, to which it is attached by a point, stigmas 3, long.

Montane zone, at about 4000 ft.; rare. Ramboda; Uva. Fl. Dec., April.

Also in the Indian mountains, E. Asia, and Australia.

## 8. **SCIRPUS,** *L.*

Glabrous herbs of various habit, often very tall, leafless or leafy at the base only (all along the stem in *S. fluitans*); stem terete, trigonous, or triquetrous; infl. terminal or lateral, of clusters or umbels of oblong or ovoid, many-fld., terete, sessile, or pedicelled spikelets (spikelets solitary in *S. fluitans*); glumes spirally imbricating round a stout or slender rhachilla, lowest two and a few uppermost empty, hypogynous bristles 0, or 2–7, retrorsely scabrid, or (*S. littoralis*) plumose; stam. 1–3, anth. linear; nut obovoid, trigonous, or biconvex, smooth or nearly so; style slender, base not broadly dilated, leaving no button on the nut; stigmas 2 or 3, slender.—Sp. about 125; 26 in *Fl. B. Ind.*

Stem leafy throughout, spikelets solitary . . . 1. S. FLUITANS.
Stem leafy at the base only or leafless.
  Spikelets sessile, fascicled.
    Annuals.
      Glumes squarrosely recurved . . . . 2. S. SQUARROSUS.
      Glumes not squarrose.
        Nut wrinkled . . . . . . 3. S. SUPINUS.
        Nut smooth . . . . . . 4. S. ERECTUS.
    Perennials.
      Stem septate within . . . . . 5. S. ARTICULATUS.
      Stem not septate.
        Spikelets in lateral clusters . . . 6. S. MUCRONATUS.
        Spikelets in terminal clusters . . . 7. S. SUBCAPITATUS.
  Spikelets in corymbiform umbels.
    Umbels terminal, bracteate . . . . 8. S. GROSSUS.
    Umbels lateral, ebracteate . . . . 9. S. LITTORALIS.

1. **S. fluitans,** *L. Sp. Pl.* 48 (1753).

Moon, Cat. 6. *Isolepis fluitans*, Br.; Thw. Enum. 350. *Eleogiton curvulus*, Nees in Wight, Contrib. 110. C. P. 835

Fl. B. Ind. vi. 653. Reichb. Ic. Fl. Germ. t. 298 (excl. nut).

A slender, annual, glabrous aquatic, often forming large floating masses, root-fibres slender; stems 6–18 in., tufted,

much branched, leafy throughout, often curved, rooting at the internodes and base; l. alternate, 1–2 in. long, very narrowly linear, $\frac{1}{20}$ in. broad or less, acuminate, straight or curved, 1-veined, green, sheaths short, open; peduncles axillary and terminal, filiform, rather longer than the l., compressed, striate; spikelet solitary, terminal, $\frac{1}{8}$–$\frac{1}{6}$ in. long, ovoid, green or brown, 4–8-fld.; glumes $\frac{1}{12}$ in. long, broadly oblong or ovate-oblong, obtuse, tip rounded, membranous, 1-veined, sides hyaline, lowest longest and narrowest; hypogynous bristles 0; stam. 3, anth. small, linear, obtuse; nut $\frac{1}{20}$ in. long, obovoid or sub-obcordate, biconvex, shortly beaked, pale, style as long as the nut, capillary, glabrous, stigmas 2, capillary.

In shallow water; common, especially in the hills. Fl. Feb., May. Nearly cosmopolitan; occurs in England commonly.

2. **S. squarrosus,** *L. Mant.* ii. 181 (1771).
Moon, Cat. 6. *Isolepis squarrosa,* R. et S.; Thw. Enum. 350. C. P. 854.
Fl. B. Ind. vi. 663. Rottb. Descr. et Ic. t. 17, f. 5.

A slender, tufted, glabrous annual, root-fibres capillary; stems 3–6 in., filiform, terete, striate; l. as long or shorter than the stem, capillary, acuminate, erect, margins involute, smooth, sheath short, open; spikelets solitary or 2–4 in a cluster, sessile, $\frac{1}{8}$–$\frac{1}{3}$ in. long, from globose to oblong, obtuse, green, very many-fld., rhachilla naked; bracts 1–3, capillary, one or two sometimes 1 in. long; glumes $\frac{1}{20}$ in. long, most densely imbricate, squarrosely spreading and recurved, trapeziform, sides acutely angled, top narrowed into a recurved cusp as long as or longer than the blade, stoutly 1-veined; hypogynous bristles 0; stam. 1 or 2, anth. very minute, oblong, apiculate, pale yellow; nut $\frac{1}{50}$ in. long, obovoid-oblong, trigonous, black, style very short or 0, stigmas 3, minute, recurved.

Damp, sandy pastures in the dry country; rather common. Jaffna; Chilaw; Nilgala. Rare in the moist districts, Colombo. Fl. Jan., May. Also in India, China, Java, and Trop. Africa.

3. **S. supinus,** *L. Sp. Pl.* 49 (1753).
Moon, Cat. 6. *Isolepis supina,* Br.; Thw. Enum. 350. C. P. 3233.
Fl. B. Ind. vi. 655. Reichb. Ic. Fl. Germ. t. 302.

A densely tufted, glabrous annual, with capillary and thickened root-fibres; stems 6–18 in., slender, obtusely trigonous, striate, flowering above the middle; l. 0, sheaths short, or long, mouth oblique, rarely produced into a very short, erect, acute limb; spikelets 3–8 in a cluster, 2–6 in. below the top of the stem, $\frac{1}{6}$–$\frac{1}{4}$ in. long, ovoid or ovoid-oblong, terete, green, all sessile or 1-or 2 on a very short peduncle (rarely

umbelled), rhachilla slender, naked; bract 0, or setaceous, short, striate; glumes membranous, closely imbricate, nearly orbicular, cymbiform, keel ending in a recurved cusp; hypog. bristles 0; stam. 3, anth. oblong, apiculate; nut $\frac{1}{30}$ in., obovoid or nearly orbicular, trigonous, black, sides strongly closely transversely rugose, style slender, as long as the nut, stigmas 3.

Low country, especially in dry region; common. Fl. March, April.
Throughout warm parts of Old World.

4. **S. erectus,** *Poir. Enc. Méth.* vi. 761 (1804).
(?) *S. lateralis*, Retz. Obs. ii. 12 (1786). Moon, Cat. 6. *S. juncoides*, Roxb.; Thw. Enum. 351. *S. debilis*, Pursh; Trim. Syst. Cat. Ceyl. Pl. 102. C. P. 850.
Fl. B. Ind. vi. 656.

A densely tufted, glabrous annual, with filiform and thickened root-fibres; stems 1–2 ft., slender, trigonous, ribbed and striate, flowering towards the top, sheaths short, mouth obliquely truncate, with rarely a short membranous limb; spikelets 3–4 in a cluster, 4–6 in. below the top of the stem, sessile, $\frac{1}{4}$–$\frac{3}{4}$ in. long, ovoid or oblong-ovoid, obtuse, terete, pale brown, rhachilla slender, naked; bract 0 but the strict acute top of the stem produced beyond the spikelet; glumes closely imbricate, nearly orbicular, $\frac{1}{8}$ in. diam., coriaceous, tumid, hardly keeled, mid vein ending in a mucro, pale, speckled with brown; hypogynous bristles 6, or fewer, or 0, shorter than the nut, retrorsely scabrid; stam. 3, anth. linear, subacute; nut broadly obovoid or obcordate, broader than long, $\frac{1}{12}$ in. diam., biconvex or subtrigonous, abruptly shortly beaked, smooth, red-brown, shining, style short, stigmas 2 or 3.

Moist low country; common. Fl. March, Sept., Nov.
Extends into temp. Asia, Australia, and America.
I think that there can be little doubt but that this is the *S. lateralis*, Retz., from Ceylon; but neither Trimen nor Clarke consider the evidence sufficient to warrant the adoption of this much earlier name.—J. D. H.

5. **S. articulatus,** *L. Sp. Pl.* 47 (1753). **Maha-geta-pan,** *S.*
Moon, Cat. 6. *Isolepis articulata*, Nees; Thw. Enum. 350. C. P. 846.
Fl. B. Ind. vi. 656. Rheede, Hort. Mal. xii. t. 71.

Stems 2–4 ft., densely tufted on a stoloniferous rootstock with slender root-fibres, as thick as a goose-quill, spongy and transversely septate within (visible externally), terete, striate, flowering nearer the base than the top; l. 0, or sheaths with a membranous, acute, erect tip, sometimes 1 in. long; spikelets $\frac{1}{6}$ to nearly 1 in., oblong-ovoid, terete or obscurely angled, sessile in a single lateral stellately spreading cluster of 20–60 sometimes $1\frac{1}{2}$ in. diam., pale brown, rhachilla never exposed; bracts 0 but the continuation of the stem; glumes closely

imbricate, persistent and marcescent on the rhachilla, membranous, about $\frac{1}{5}$ in. long, broadly ovate, subacute, mucronate, not keeled, mid vein slender, margins broadly hyaline; hypogynous bristles 0; stam. 3, anth. linear, obtuse; nut $\frac{1}{16}$ in., trigonously obovoid, black, opaque, angles rather acute, faces convex, smooth, tip with a minute cone, style slender, stigmas 3.

Wet places, especially in the dry region; common.

Also in India, Philippine Is., Australia, Africa.

Roxburgh (Fl. Ind. i. 215) describes the glumes as broadly cordate, and the styles as slightly 2-cleft. I find the stigmas to be sometimes as long as the style.

6. **S. mucronatus,** *L. Sp. Pl.* 50 (1753).

*S. triangulatus*, Roxb.; Nees in Wight, Contrib. 111. Thw. Enum. 251. C. P. 41.

Fl. B. Ind. vi. 657. Reichb. Ic. Fl. Germ. t. 303.

Stems 1–2 ft., tufted on a small rootstock with rather stout root-fibres, as stout as a goose-quill, triquetrous or almost 3-winged, spongy, striate, flowering near the top; l. 0, sheaths membranous with a very oblique mouth obtuse at the tip; spikelets $\frac{1}{3}$ to nearly $\frac{2}{3}$ in., ovoid or oblong-ovoid, terete, sessile in a single lateral cluster $\frac{1}{2}$–1 in. diam., pale with brown or purple margins of the glumes, rhachilla never exposed; bracts 0 but the short top of the stem; glumes $\frac{1}{6}$ in. long, closely imbricate, persistent and marcescent on the rhachilla, membranous, broadly ovate, apiculate, veins 0, or one very slender, not keeled, margins opaque; hypogynous bristles 5 or 6, unequal, retrorsely scabrid; stam. 3, anth. linear-oblong; nut broadly obovate or nearly orbicular, $\frac{1}{12}$ in. diam., biconvex, minutely beaked, dark brown, polished, margins obtuse, style slender, stigmas 3.

Margins of ponds, &c., throughout the island; common. Fl. Dec., Jan., March.

Also in Europe, Asia, Australia, Madagascar.

7. **S. subcapitatus,** *Thw. Enum.* 351 (1864).

C. P. 306.

Fl. B. Ind. vi. 661.

Stems 8–18 in., densely crowded on a short creeping rootstock with very stout root-fibres, as thick as a sparrow's quill, terete, striate; l. 0, sheaths elongate, coriaceous, striate, mouth obliquely truncate, acute, with scarious brown margins and cuspidate tip; spikelets $\frac{1}{4}$–$\frac{1}{2}$ in., 3–6 in a terminal subspicate cluster, ovate-oblong, erect, pale brown, rhachilla rather stout, scarred; bract 0, or much shorter than the spikelets; glumes loosely imbricate, thin, $\frac{1}{6}$ in. long, ovate-oblong, obtuse, keel 3-veined, not prominent, green, sides membranous, pale, speckled with brown, tips papillose; hypogynous bristles 6,

much longer than the nut, very slender; stam. 3, anth. linear-oblong, very persistent; nut elongate-obovate, or ellipsoid, $\frac{1}{16}$ in. long, plano-convex, beaked, smooth, dark brown, style slender, stigmas 3.

In streams, montane zone, 4–7000 ft.; rather rare. Nuwara Eliya; Maskeliya; Wattakelle. Fl. Jan., March, April.

Also in Nilgiris, Sumatra, and China.

8. **S. grossus,** *L. f. Suppl. Pl.* 104 (1781).
Thw. Enum. 351. C. P. 847.
Fl. B. Ind. vi. 659.

Rootstock stout, with thick root-fibres, stoloniferous or not; stem 6–10 ft., as thick as the little finger, triquetrous, spongy, angles smooth, sides concave; l. few, radical, 2–3 ft. long by $\frac{1}{2}$ in. broad, triquetrous, finely acuminate, coriaceous, margins smooth or scaberulous, sheath long, open; spikelets $\frac{1}{8}$–$\frac{1}{4}$ in., globose or globosely ovoid, dark brown, in large corymbiform decompound terminal open or contracted umbels 3–8 in. diam., rays rigid, erect or spreading, up to 5 in. long; rhachilla slender; bracts very large, up to 3 ft. by $\frac{1}{2}$–$\frac{2}{3}$ in. broad at the base, flat, leaf-like, margins scaberulous; glumes rather loosely imbricate, membranous, orbicular, $\frac{1}{12}$ in. diam., concave, almost hemispheric, slenderly keeled above the middle, tip rounded; hypogynous bristles 6, or fewer, unequal, retrorsely scabrid; stam. 3, anth. linear, subacute; nut $\frac{1}{16}$ in., obovoid, trigonous, dark brown or black, shining, tip conical, style slender, stigmas 3.

Low country; rather rare. Anuradhapura (Gardner); Galle; Reigam Korale. Fl. July.

Also in India, Malaya, Philippine Is.

9. **S. littoralis,** *Schrad. Fl. Germ.* i. 142 (1806).
*S. pectinatus*, Roxb.; Thw. Enum. 351. C. P. 831.
Fl. B. Ind. vi. 659.

Rootstock stout, hard, with matted fibrillose root-fibres; stem 3–4 ft., as thick as the thumb at the soft base, and as a crow-quill above, trigonous above, spongy, striate, smooth, flowering near the top; l. 6–24 in. by $\frac{1}{4}$ in. or less broad, finely acuminate, membranous, mid vein obscure, margins nearly smooth, sheaths long, soft, open; spikelets $\frac{1}{4}$–$\frac{1}{2}$ in., oblong, obtuse, terete, subsolitary, pedicelled, in lax terminal irregular subcorymbose or panicled umbels, with drooping rays 1–2 in. long, pale brown, rhachilla slender; bracts minute; glumes closely imbricate, membranous, $\frac{1}{6}$ in. long, orbicular-oblong, concave, tip notched, keel slender, produced into a short cusp; hypogynous bristles 2–7, unequal, linear, plumose with moniliform hairs; stam. 2 or 3, fil. very broad, anth. slender, tipped with a red appendage; nut variable, biconvex,

beaked, dull brown, smooth, rather shining, either broadly obovoid, turgid, $\frac{1}{16}$–$\frac{1}{14}$ in. long, or larger, longer, more flattened, and nearly $\frac{1}{10}$ in. long, style slender, stigmas 2.

Tidal mouths of rivers, in brackish water; rather rare. Kalutara; old mouth of Kelani, Colombo. Fl. Dec., April.

Also in Europe, W. Asia, Africa, Australia.

### 9. **WEBSTERIA,*** *S. H. Wright.*

A submerged leafless aquatic, with filiform umbellately branched stems, bearing pseudo-whorled fascicles of capillary leaves at the nodes; spikelets solitary, on filiform peduncles from amongst the leafing nodes; glumes 2, elongate-lanceolate, lower empty, upper with one bisexual fl.; hypogynous bristles 6–10, retrorsely spinulose; stam. 2–3, exserted at the top of the glume, fil. flattened, anth. linear, very slender, tip apiculate; ov. obovoid, flattened, style very slender, base conical, stigmas 2 or 3, filiform; nut broadly obovoid, long-beaked by the persistent style-base, biconvex, sides rounded, smooth, pale.—Monotypic.

**W. limnophila,** *S. H. Wright in Bull. Torr. Club*, xiv. 135 (1887). *Scirpus submersus*, Sauvalle, Fl. Cub. 175. *Rhynchospora ruppioides*, Benth. in Hook. Ic. Pl. xiv. 31. Trim. Syst. Cat. Ceyl. 103. C. P. 3936.
Fl. B. Ind. vi. 653 (*Scirpus submersus*). Hook. Ic. t. 1344.

Whole plant flaccid, tassel-like when lifted out of the water; stems 12 in. long and upwards, rooting in the mud; lower internodes elongate, terete, smooth, upper shorter; fascicles of l. at the nodes, with minute hyaline bracts at the base; l. very numerous, 1–4 in. long, ultra-capillary, tubular, sheaths short, hyaline; ped. $\frac{1}{2}$–10 in. long, filiform, smooth, 4-fistular, base often rooting, enclosed in a hyaline sheath; spikelets $\frac{1}{4}$–$\frac{1}{2}$ in.; glumes erect, membranous, with hyaline margins, green, tips narrowed, lower 3-veined, upper rather longer, 1-veined; bristles longer or shorter than the nut, yellow; nut, with its long beak $\frac{1}{8}$–$\frac{1}{7}$ in., tip of beak black where the true style has rotted away, pericarp thick.

In deep ditches. Cinnamon Gardens, Colombo (Ferguson). Fl. Feb. to June.

Java, Madagascar, Trop. America.

Clarke describes (Fl. Brit. Ind.) an upper male or empty glume as sometimes present. The description in Hook. Ic. Plant. is inaccurate, and does not accord with the accompanying figure.

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* Commemorates Mr. G. W. Webster, of Florida, who first found the plant in fruit in America.

10. **FUIRENA,** *Rottb.*

Annual or perennial, leafy herbs, glabrous or pubescent; l. linear-lanceolate, sheaths entire, with an annular membrane at the mouth; spikelets many-fld., sessile in dense, axillary, peduncled, and terminal clusters; glumes imbricate all round the rhachilla, orbicular or obovate-oblong, membranous, with a stout 3-veined keel, ending in a cusp or stout scabrid awn; hypogynous bristles 3, minute, or 0; hypog.-scales 3, enclosing the nut, stipitate, quadrate, strongly 3-veined, glabrous or ciliate; stam. 2–3; nut trapezoid, trigonous, narrowed into a stipes below, and into a long or short cusp or beak above, angles acute, sides smooth, pale; style slender, finally deciduous, stigmas 3.—Sp. 26; 6 in *Fl. B. Ind.*

Annual, l. hairy.
Spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., rhachilla slender . . . 1. F. GLOMERATA.
Spikelets $\frac{1}{10}$–$\frac{1}{6}$ in., rhachilla obsolete . . . 2. F. UNCINATA.
Perennial. l. glabrous . . . . . . . . 3. F. UMBELLATA.

1. **F. glomerata,** *Lam. Ill.* i. 150 (1791).
Thw. Enum. 347. C. P. 2748.
Fl. B. Ind. vi. 666. Rottb. Descr. et Ic. t. 17, f. 1 (*Scirpus ciliaris*).

Annual; stem 4–16 in., slender, erect, leafy, sparsely hairy above, glabrous below; l. 2–5 by $\frac{1}{6}$–$\frac{1}{4}$ in., linear-lanceolate, acuminate, 3–5-veined, more or less hairy, sheaths long, closed; spikelets $\frac{1}{6}$–$\frac{1}{3}$ in. long, sessile, in terminal and peduncled axillary clusters, $\frac{1}{2}$–1 in. diam., ovoid or oblong, obtuse, dark brown, rhachilla slender, lowest glumes longest, empty; bracts 0 but the leaf under each cluster of spikelets; glumes closely squarrosely imbricate, at length deciduous, $\frac{1}{12}$–$\frac{1}{10}$ in. long, membranous, obovate-oblong, obtuse, 3-veined, keel ending in a stout hairy awn half as long as the glume, tip ciliolate; scales stipitate, quadrate, 3-lobed, 3-veined, glabrous, lobes obtuse or shortly produced, median longest, base lunate on each side of the stipes; nut $\frac{1}{30}$ in., trapezoidly trigonous, cuspidate, smooth, pale, angles acute.

Wet places, especially paddy fields; common. Fl. May, &c.
Throughout Tropics of Old World.

2. **F. uncinata,** *Kunth, Enum.* ii. 184 (1837).
*F. ciliaris*, Nees in Wight, Contrib. 93; Thw. Enum. 347 (non Roxb.). C. P. 3038.
Fl. B. Ind. vi. 666.

Annual; stem 4–12 in., rather stout, leafy, glabrous below, pubescent above; l. 2–6 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear-lanceolate, acuminate, membranous, 3–5-veined, laxly hairy on both surfaces; sheaths long, closed, hairy; spikelets, $\frac{1}{10}$–$\frac{1}{6}$ in., densely crowded

in capitate, axillary, sessile or peduncled, simple or lobed clusters $\frac{1}{4}$–$\frac{1}{2}$ in. diam., pale brown, lowest glumes larger, empty, with a broad membranous blade and longer awn, rhachilla hardly any; bracts at the base of the clusters like large glumes, within which are a few very short broad hyaline ciliate scales unlike either the bracts or glumes; glumes few, persistent on the rhachilla, at length hardened, $\frac{1}{10}$ in. long, obovate, cymbiform, hispidly hairy, stoutly 5-veined, keel of 2 very strong veins meeting in a straight or recurved scabrid cusp half as long as the glume; hypogynous scales quadrate, upper margin thickened, ciliate, retuse with a scabrid awn; nut $\frac{1}{40}$–$\frac{1}{30}$ in. long, stipitate, trapezoidly trigonous, beaked, angles acute, smooth, pale, style longer than the nut.

Paddy fields and wet places; very common. Fl. Dec., July.
Southern India.

Differs remarkably from *F. glomerata* in the very short spikelets, with the glumes persistent on the hardly distinguishable rhachilla.

3. **F. umbellata,** *Rottb. Descr. et Ic.* 70 (1773).
*F. pentagona*, Nees in Wight, Contrib. 93. *F. uncinata*, Thw. Enum. 347 (non Kunth). C. P. 3229, 3330.
Fl. B. Ind. vi. 666. Rottb. l. c. t. 19, f. 3.

Perennial, rootstock hard, stoloniferous or shortly creeping with filiform root-fibres; stem 1–4 ft., stout or slender, ribbed, nearly glabrous, except at the tomentose infl.; l. very variable, 6–12 in., up to $\frac{2}{3}$ in. broad, linear-lanceolate, obtusely acuminate, 3–5-veined, glabrous or ciliate towards the base, margins smooth or nearly so, sheaths long, closed, mouth with a ciliolate brown ligule; spikelets $\frac{1}{5}$–$\frac{1}{3}$ in., ovoid or oblong, sessile, crowded in simple or compound axillary peduncled and terminal, sometimes subpanicled clusters $\frac{1}{2}$–1 in. diam., dark brown, ped. tomentose or villous, rhachilla slender; bracts under the clusters short, cuspidate; glumes closely imbricate, at length deciduous, $\frac{1}{8}$ in. long, membranous, broadly obovoid, retuse or 2-lobed, glabrous or puberulous and ciliate, keel stout, of 3 veins meeting in a scabrid stout cusp half as long as the glume; scales obovate-quadrate, upper margin thickened, cuspidate; stam. 3, anth. rather stout, apiculate; nut $\frac{1}{16}$–$\frac{1}{14}$ in., stipitate, trapezoidly trigonous, long-beaked, angles acute, obscurely 3-ribbed dorsally, smooth, pale, style as long as the nut.

Wet places and paddy fields; common. Fl. Sept., Feb., March.
All hot, moist countries.

### 11. LIPOCARPHA, *Br.*

Glabrous, erect herbs; stem slender, leafy towards the base only; l. very narrow, gradually passing into the open sheath;

spikelets short, terete, sessile in small terminal heads of 3–7, with long slender bracts; glumes very many, minute, densely imbricate, cuneately spathulate, glabrous, 1-veined, not keeled, at length deciduous, rhachilla stout, terete, naked; hypogynous bristles 0, scales 2, oblong, membranous, strongly veined, white, hyaline, convolute, completely enveloping the nut; stam. 1, anth. small; nut narrowly oblong, trigonous, apiculate or with a terminal conical top; style short, stigmas 3.—Sp. 13; 3 in *Fl. B. Ind.*

Spikelets silvery white . . . . . . . . . 1. L. ARGENTEA.
Spikelets purplish brown . . . . . . . . 2. L. TRICEPS.

1. **L. argentea,** *Br. in app. Tuckey Congo*, 459 (1818).
*L. lævigata*, Nees in Wight, Contrib. 92. Thw. Enum. 347. C. P. 819, 3557.
Fl. B. Ind. vi. 667.

Perennial (?); rootstock small, root-fibres stout; stem 6–8 in., slender, subtrigonous, grooved, or stout in dwarf specimens; l. much shorter than the stem, very slender, gradually narrowed from the sheath to the obtuse tip, coriaceous, margins involute, smooth, lower often shorter, stouter, recurved, sheath green, open; spikelets 3–7 in., sessile in a dense terminal head, $\frac{1}{6}$–$\frac{1}{3}$ in. long, shortly ovoid, terete, top rounded, silvery grey, rhachilla stout, closely covered with orbicular scars; bracts 3–5, slender, 1–2 much the longest, up to 4 in. long, horizontally spreading; glumes very numerous and closely imbricate, $\frac{1}{15}$–$\frac{1}{10}$ in. long, membranous, broadly obovate-oblong, or cuneately spathulate, acute or obtuse, concave, midrib not keeled, scales longer than the nut, oblong, hyaline, 3-veined; nut $\frac{1}{20}$ in., linear-oblong or narrowly obovate-oblong, obtusely trigonous, straight or slightly curved, mucronate, grey-brown, style shorter than the nut.

Moist places up to 5600 ft.; common. Fl. March, July.
Throughout warmer regions of Old World.

2. **L. triceps,** *Nees in Wight, Contrib.* 92 (1834).
*L. sphacelata*, Kunth, Enum. ii. 267 (1837). Thw. Enum. 347. *Hypælyptum ceylanicum*, Nees in Linnæa, ix. 288. C. P. 3756.
Fl. B. Ind. vi. 667. Lam. Ill. t. 38, f. 2 (*Kyllinga triceps*).

Perennial (?); rootstock small, hard, with slender root-fibres; stem 4–14 in., leafy at the base, slender, subtrigonous, striate; l. much shorter than the stem, narrowed from the sheath to the obtuse tip, or widening up to $\frac{1}{6}$ in. broad in the middle, flat, margins smooth, sheath open, green; spikelets 3–5, sessile, in a small terminal head, $\frac{1}{6}$–$\frac{1}{4}$ in. long, subglobose or ovoid, terete, tip rounded, purplish brown; rhachilla stout,

covered closely with orbicular scars; bracts 3–5, slender, 1–2 much the longest (up 3 in.), horizontally spreading; glumes very numerous and tightly imbricate, $\frac{1}{18}$ in. long, cuneately oblong, with a broad triangular obtuse or acute incurved top, 1-veined; scales oblong, strongly 5-veined; anth. short, apiculate; nut $\frac{1}{20}$ in. long, oblong, obtusely trigonous, stipes very broad, tip with a stout conical beak, style and 3 stigmas very much shorter than the nut.

Low country; rare. Dumbala Dist. (Thwaites); Kurunegala. Throughout India, also in Trop. Africa and America.

### 12. **ACTINOSCHŒNUS,** *Benth.*

Glabrous herbs; stems crowded on a creeping rootstock with rather short matted root-fibres, erect, filiform, triquetrous, smooth, base sheathed; spikelets small, linear, sessile, stellately crowded together, forming a solitary globose terminal bracteate head; outer bracts few, linear-subulate, concealed under the head; glumes 6–8, distichous, lowest minute, broadly ovate, obtuse, hyaline, 3 or 4 succeeding short, broadly ovate with a long recurved cusp, 2 (rarely 3), uppermost much longer, convolute, 3–5-veined, tip 2-fid with an erect or recurved cusp, both bisexual; hypogynous bristles 0; stam. 3, anth, long, slender, subacute; nut globosely obovoid, triquetrous, obscurely papillose, white, style capillary, glabrous, base conical, calyptriform, at length deciduous, stigmas 2 or 3, capillary.—Sp. 7; 1 in *Fl. B. Ind.*

**A. filiformis,** *Benth. in Hook. Ic. Plant.* xiv. 33 (1881).
*Arthrostylis filiformis*, Thw. Enum. 352. C. P. 3469.
*Fimbristylis Actinoschœnus*, Clarke in Fl. B. Ind. vi. 650.
Fl. B. Ind. l. c. Hook. Ic. Pl. t. 1346.

Stems 1–3-ft., sheaths very short, with sometimes a subulate blade; heads $\frac{1}{3}$–$\frac{1}{2}$ in.; spikelets $\frac{1}{7}$–$\frac{1}{6}$ in., green; anth. nearly as long as the upper glume; nut $\frac{1}{20}$ in. long, margin of calyptriform base of the style lacerate.

Moist region up to 4000 ft.; rather rare. Ambagamuwa; Karawita; Ruanwelle; Labugama; Rangala Ridge, abundant. Fl. all the year.
Also in the Malay Peninsula, and at Hong Kong (a variety).

### 13. **RHYNCHOSPORA,** *Vahl* (Rynchospora).

Usually tall herbs, of various habits; stem simple, leafy throughout, rarely at the base only, stout or slender; l. narrow, often filiform; spikelets small, ovoid, capitate, corym-

bose, subumbellate, or panicled, with 1 or 2 bisexual fl.; bracts various; glumes imbricate all round the rhachilla, membranous or coriaceous, 1-veined, 3 or 4 lower shorter empty, the following 1 or 2 fruiting, uppermost empty; hypogynous bristles 0, or 6, rarely fewer, scabrid, the teeth pointing upwards; stam. 1–3, anth. linear; style slender, glabrous, base conical, stigmas 2; nut ovoid or subglobose, turgidly biconvex, smooth or transversely waved, crowned by the conical greatly enlarged often very long and stout persistent base of the style, stigmas 2–3.—Sp. 188; 14 in *Fl. B. Ind.*

Stem leafy towards the base only . . . . 1. R. WALLICHIANA.
Stem leafy throughout.
  Style short, stigmas short.
    Spikelets very many, clustered . . . 2. R. AUREA.
    Spikelets scattered, ternate . . . . 3. R. TRIFLORA.
  Style long, stigmas long.
    Spikelets few, distant, solitary . . . 4. R. GRACILLIMA.
    Spikelets clustered . . . . . . 5. R. GLAUCA.

1. **R. Wallichiana,** *Kunth*, *Enum.* ii. 289 (1837).
Thw. Enum. 352. C. P. 2476.
Fl. B. Ind. vi. 668.

Stems 1–2 ft., tufted, slender, striate, leafy at the base only, root-fibres stout, soft; l. shorter than the stem, narrowly linear, up to $\frac{1}{6}$ in. broad, flat or complicate, narrowed from the sheath to the tip, acute, serrulate, margins nearly smooth, sheath continuous with the blade, lower open, upper closed to near the top; spikelets about $\frac{1}{3}$ in. long, sessile, densely clustered in a terminal, globose, chestnut-brown, shining head $\frac{1}{2}$–$\frac{2}{3}$ in. diam., mixed with minute ovate hyaline scales; bracts very narrow, spreading, bases ciliate, broad, outer 2–3 in. long; glumes glabrous, lower 3–4 short, ovate-lanceolate, empty, upper flowering, linear-lanceolate, acuminate; hypogynous bristles, if present, as long as the nut or shorter, scabrid with suberect teeth; stam. 2–3, anth. linear-oblong, tip acute; nut $\frac{1}{20}$–$\frac{1}{12}$ in. long, obovoid, turgidly biconvex, with a broad, conical, puberulous, terminal button, nearly black, hispidulous towards the top, style very slender, stigmas 2, very long.

Open places in the moist region up to 4000 ft.; rather common. Fl. all the year,

Tropics of Old World generally.

2. **R. aurea,** *Vahl*, *Enum.* ii. 229 (1806).
Moon, Cat. 6. Thw. Enum. 252. C. P. 199.
Fl. B. Ind. vi. 670. Rottb. l. c. t. 21, f. 1 (*Schœnus surinamensis*).

Stem 2–3 ft., stout, trigonous, leafy throughout, angles nearly smooth, root-fibres stout; l. 1–2 ft. by ½–1 in., contracted at the sheath, then narrowed up to the acute suberulous tip, flat, margins and slender keel scabrid, sheaths of upper closed, with an annular brown membrane at the mouth, of lower open, continuous with the blade; spikelets very many, clustered or spicate at the ends of the branches of large, corymbiform, decompound, terminal, and axillary umbels 3–5 in. broad; bracts foliaceous, up to 6 in. long, bracteoles at the bases of the rays subulate, those at the bases of the clusters acicular; spikelets about ¼ in., narrowly ovoid, acuminate; glumes 6–7, 3–4 lower empty, ovate, lowest mucronate or awned, the following one longer, ovate, cymbiform, mucronate, bisexual, upper male or empty; hypogynous bristles 6 or fewer, very slender, scaberulous; stam. 3, anth. linear, obtuse; nut ¼ in., dull brown, obovoid, truncate, compressed, sides rounded, faces slightly transversely undulate, beak conical, longer than the nut and as broad at the base, broadly channelled down the centre, style short, slender, stigmas 2, very short.

Moist low country in paddy fields and wet places; common. Fl. Nov., Feb., &c.

Throughout the Tropics.

3. **R. triflora,** *Vahl, Enum.* ii. 232 (1806).

*Cephaloschœnus zeylanicus*, Nees in Wight, Contrib. 115. *R. zeylanica*, Kunth, Enum. ii. 294; Thw. Enum. 352. C. P. 3036.

Fl. B. Ind. vi. 670.

Rootstock short, woody, with very stout root-fibres, often stoloniferous; stem 3–4 ft., leafy throughout, robust below, slender upwards, trigonous, striate, angles smooth; l. 12–18 by ¼ in. or less, narrowly linear, not contracted at the ligule, narrowed up to the obtuse tip, coriaceous, margins and keel scabrid, or margins thickened and quite smooth; sheaths of lower open, of upper closed, with a very short membrane at the sinus; spikelets small, usually ternate, in lax, terminal, and axillary, open, compound corymbs, rays few, very slender, up to 3 in. long; bracts slender, much shorter than the corymbs, bracteoles acicular, sheathing at the base; spikelets ¼ in. long, very narrowly ovoid, acuminate, brown, rather shining; glumes about 6, lowest ovate, awned, second and third broadly oblong, rounded at the tip and awned, flg. longer, oblong-ovate, cymbiform, acute, cuspidate; hypogynous bristles 6 or fewer, very slender, unequal, scaberulous; stam. 3, anth. very long, slender, acuminate; nut with its beak ⅓ in. long, narrowly obovoid, compressed, red-brown, shining, sides rounded, faces

minutely transversely undulate, beak longer than the nut, subulate, scaberulous, style short, stigmas 2, very short.

Moist low country, below 1000 ft. Bentota; Ratnapura. Fl. March, Dec.
Also in Trop. America.

4. **R. gracillima,** *Thw. Enum.* 435 (1864).
C. P. 3818.
Fl. B. Ind. vi. 671.

Stems 2–3 ft., densely tufted, filiform, rooting at the lower nodes, leafy at the base and upward, root-fibres slender; l. shorter than the stem, up to a foot long, filiform, flexuous, margins involute, tip flat, obtuse; sheath slender, with scarious margins above, closed below; spikelets $\frac{1}{4}$ in., in very lax, long-peduncled, axillary, loose, irregular, subcorymbiform panicles, narrowly ovoid, acute, terete, brown, branches of panicles 1–2 in., pedicels $\frac{1}{2}$–1 in., both capillary; bracts acicular; glumes membranous, 3–5 lower ovate, cuspidate, empty, 2–3 upper much longer, broader, convolute, flg.; bristles 0; stam. 2, anth. long, linear, obtuse; nut globose, obovoid, or subcubical, deeply irregularly ridged transversely, white, at length black, beak broad, short, conical, style long, very slender, stigmas 2, long.

Moist low country in wet places; very rare. Hewesse and neighbourhood (Thwaites). Fl. Aug., Sept., &c.
Also in Nicobar Is., Khasia Hills, Hong Kong.

5. **R. glauca,** *Vahl, Enum.* ii. 233 (1806).
*R. laxa*, var. *β*, *minor*, Thw. Enum. 352. C. P. 2396.
Fl. B. Ind. vi. 672.

Rootstock small, hard, with stout root-fibres; stem 1–2$\frac{1}{2}$ ft., slender or rather stout, trigonous, striate, leafy throughout; lower l. as long as the stem, upper shorter, very narrow, $\frac{1}{10}$ in. broad or less, coriaceous, flat, not keeled, narrowed from the sheath (where not contracted) to the obtuse tip, margins almost smooth, sheaths coriaceous, open; spikelets $\frac{1}{6}$–$\frac{1}{5}$ in.; ovoid, dull brown, clustered in small, loose, terminal, and axillary corymbs, about 1 in. long, very shortly pedicelled, the terminal corymb most compound, $\frac{1}{2}$–$\frac{3}{4}$ in. diam.; glumes 6–7, lower smaller, ovate, cuspidate, empty, upper 1 or 2 broader, convolute, membranous, apiculate, flg., terminal narrow, empty; bristles shorter than the nut, scabrid; stam. 1 or 2, anth. linear, obtuse; nut broadly obovoid, compressed, biconvex, margins acute, pale brown, crowned with the long or short, greatly enlarged, conical or subulate, pubescent style-base, which is sometimes as long as the nut, faces finely, closely, transversely wrinkled, stigmas 2.

Var. β, **chinensis,** *Clarke.* *R. laxa*, Thw. Enum. 352 (non Vahl). C. P. 677.

Spikelets longer, beak short or long.

Grassy places in the montane zone, alt. 4–6000 ft.; common. Var. β in the moist low country; common. Fl. Aug., Sept., Dec.

Throughout the warm regions of the world.

The much larger spikelets of var. β look very different, but I can find no other distinguishing character. The beak of the nut varies greatly in both, and is sometimes even larger than the nut.

## 14. **CLADIUM,** *P. Br.*

Tall, usually stout sedges; rootstock creeping, with stout root-fibres; stem leafy throughout, or towards the base only; l. various; spikelets small, variously panicled, often clustered in sheaths at the angles of zigzag branches; glumes few, imbricate all round the rhachilla, coriaceous, lower 1–3 empty, then 1–3 flg., terminal empty; hypogynous bristles 6; stam. 3, anth. long, narrow; style slender, deciduous, base dilated, stigmas 3; nut obovoid or oblong, trigonous, beaked, crowned with the greatly enlarged style-base.—Sp. 28; 5 in *Fl. B. Ind.*

Nut with a long subulate beak . . . . . 1. C. UNDULATUM.
Nut with a dome-shaped pubescent crown . . 2. C. CRASSUM.

1. **C. undulatum,** *Thw. Enum.* 353 (1864).

*Lepidosperma zeylanicum*, Boeck. in Linnæa, xxxviii. 232. *Tricostularia zeylanica*, Benth. Fl. Austral. vii. 384 (in note). C. P. 3236.

Fl. B. Ind. vi. 674.

Stem 1–3 ft., slender, trigonous, striate, smooth, leafy towards the base only; l. longer or shorter than the stem, very slender, $\frac{1}{10}$ in. broad or less, rigidly coriaceous, narrowed from the sheath to the very slender obtuse tip, margins revolute, scaberulous, midrib broad, flat, sheaths short, coriaceous, red brown, open, margins scarious; panicles 4–6 in., terminal, rather narrow, branches zigzag; spikelets narrow, $\frac{1}{6}$ in. long, in clusters of 2 or more in a bracteole at the angles of the branches, 1-fld.; glumes 4, 2 lower smaller, ovate, cuspidate, empty, third much longer, ovate, obtuse, 1-veined, fourth rather longer than third, with a perfect fl.; bristles 6, very short; stam. 3, anth. very long, with long acicular tips; nut $\frac{1}{20}$ in. long, broadly obovoid, subtrigonous, beaked by the elongate, conical, broad base of the style, smooth, nearly black, style long, slender, stigmas 3, long.

Sandy ground near the coast in the moist region; rather common. Colombo; Bentota; Kalutara (Moon); Madampe, near Negombo. Fl. May.

Also in Malaya and Australia.

2. **C. riparium,** *Benth. Fl. Austral.* vii. 405 (1878), var. **crassum,** *Clarke in Fl. B. Ind.* vi. 675 (1894). *Baumea crassa,* Thw. Enum. 353. C. P. 845.
Fl. B. Ind. l. c.

Rootstock short, with stout, black root-fibres; stem 3–4 ft., stout, as thick as the thumb at the base, flattened, spongy, striate, green, margins rounded, smooth; l. 2–3 ft., linear, acuminate, pungent, very variable in breadth, up to nearly $\frac{1}{2}$ in., spongy, laterally flattened, biconvex, with rounded, smooth margins, striate, sheaths long, distichous, open, very thick, shining, margins scarious; panicles 6–12 in., narrow, rhachis stout, branches erect, with small, sheathing, leaf-like bracts at the base, rigid, compressed, scaberulous; spikelets $\frac{1}{6}$–$\frac{1}{4}$ in., oblong, fascicled in shortly pedicelled sheaths, brown; glumes 4–6, coriaceous, lowest 1 or 2 small, ovate, then a large, broadly ovate, acute, ciliate, keeled glume, with stamens only, followed by a smaller with a perfect fl., terminal glume narrow, empty; stam. 3, anth. long, tip cuspidate; nut oblong, $\frac{1}{5}$ in. long, obscurely trigonous, yellow- or red-brown, polished, capped by the dome-shaped, pubescent style-base, style short, rather rough, stigmas 3, very long.

Moist region; very rare. Ambagamuwa Dist.; Wattawalla. First collected by Gardner. Fl. Jan., May, &c.
Also in Bengal and the Khasia Hills (the type in W. Australia).

## 15. **REMIREA,** *Aubl.*

A low, creeping, branching, rigid, glabrous perennial; stem several feet long, extensively creeping and rooting, loosely sheathed, giving off short, erect, densely leafy flg. branches, internodes 1–2 in. long, sheaths scarious, acuminate, flg. branches clothed below with long, imbricating, scarious sheaths; l. very many, 1–2 in. long, rigid, spreading and re-curved, pungent, sheaths very short, open, closely imbricating; spikelets small, short, 1-fld., crowded in a terminal, ovoid, lobed head; glumes 4, 3 lower empty, second and third larger, orbicular, concave, upper very thick, corky, 1-fld.; hypogynous scales or bristles 0; stam. 3, anth. linear, acute; nut closely embraced by the 2 upper glumes, linear-oblong, obtusely trigonous, beaked, style very short, base thickened, stigmas 3, short.—Monotypic.

**R. maritima,** *Aubl. Pl. Guian.* i. 45 (1775).
R. pedunculata, Br.; Thw. Enum. 345. C. P. 3227.
Fl. B. Ind. vi. 677. Beauv. Fl. Owar. t. 73.

Stem as thick as a crow-quill or less, curved, hard, terete, internodes 2 in. long, sheaths rather longer than the internodes, tips long, acute; branches erect or ascending, 3–5 in. long, slender, simple, sheathed for two-thirds of their length, leafy above; l. subulate, concave or with infolded sides, dorsally rounded, 1-veined; head of spikelets about $\frac{1}{2}$ in. long and broad, sessile or shortly peduncled; bracts like the upper leaves but shorter; spikelets sessile, about $\frac{1}{6}$ in. long and broad; lowest glume small, next 2 above orbicular, concave, many-veined, coriaceous, margins scarious; flg. glume oblong, nearly as long as the outer glumes, but much narrower, obtuse, dorsally rounded, smooth, shining, very thick, at length corky, with narrow margins which embrace the nut; nut $\frac{1}{10}$ in. long, brown, straight or slightly curved.

Sandy sea-shore all round the island. Fl. April, October, &c.
All Tropical shores.

I have described this widely diffused plant after the Ceylon specimens in Herb. Peraden. It appears to vary in habit in other localities.—J. D. H.

### 16. **LEPIRONIA,** *L. C. Rich.*

Rootstock stout, woody, creeping, root-fibres vermiform; stems densely tufted, tall, cylindric, transversely septate within, smooth, striate, sheathed below; l. 0; spikelets solitary, lateral near the top of the stem, ellipsoid, obtuse, brown; bract 0, except the produced top of the stem; glumes many, closely spirally imbricate round the rhachilla, coriaceous, at length deciduous, all but a few lowest flg.; scales 8–11 or more, scarious, brown, 2 outer placed right and left, linear-oblong, obtuse, concave, keeled, keel ciliate, the rest linear-lanceolate, acute, flat, 3 uppermost quasi-whorled; stam. 8 or more, one in the axil of each of the keeled scales, others solitary in the axils of some of the inner scales, uppermost scales empty, fil. long, slender, anth. 3, linear, mucronate; ov. central amongst the scales, flat, sessile, style short, stigmas 2; nut broadly obovoid, compressed, plano-convex, strongly beaked, sides obscurely undulate, margins acute.—Monotypic.

**L. mucronata,** *Rich. in Pers. Syn.* i. 70 (1805). **Étapan,** *S.*
Thw. Enum 346. C. P. 3228.
Fl. B. Ind. vi. 684. Miq. Ill. Fl. Arch. Ind. t. 20.

Rootstock clothed with short brown scales; stems 2–3 ft., as thick as a small goose-quill at the base, tapering upwards to the acicular stiff tip, green, rigid, septa close together, 3–6

or more in an inch, sheaths up to 8 in. long, coriaceous, shining, closed up to an inch or so of the obtuse apiculate tip; spikelets $\frac{1}{4}$–$\frac{2}{3}$ in. long by $\frac{1}{5}$–$\frac{1}{3}$ in. diam.; rhachilla stout, elongate-conical, covered with minute orbicular scars; glumes about $\frac{1}{5}$ in. long, broadly obovate-oblong, all but the two lower without veins or keels; scales as long as the nut, pale brown; nut (with the beak) $\frac{1}{6}$ in. long, sometimes hispidulous towards the top, margins acute.

Moist low country under 1000 ft., generally on the coast. About Colombo, abundant; Kalutara; Negombo Canal; Hewesse. Fl. Dec.–Feb.

Also in Madagascar, Malaya, Queensland, Fiji Is.

### 17. **HYPOLYTRUM,** *L. C. Rich.*

Stout, perennial herbs, with a woody rootstock and very stout root-fibres; stem erect, trigonous, leafy; l. long, narrow, linear or ensiform, coriaceous, broadest about the middle, 3-veined; spikelets small, ovoid or subglobose, in broad sub-umbelliform panicles, with stout, spreading, bracteolate branches, or the panicle contracted into a more or less compact lobed head; bracts leaf-like, bracteoles coriaceous; glumes many, closely imbricate in fl., spreading in fr., persistent, lower 2–4 empty; hypogynous scales 2 (rarely more), placed right and left, narrow, keeled, bristles 0; stam. 2–3, fil. long; ov. flattened, turbinate, beaked, style articulate on the beak, very early deciduous, stigmas 2–3, filiform; nut rounded or obtusely angled, endocarp hard, thick, beaked or not.—Sp. about 25; 7 in *Fl. B. Ind.*

Glumes obtuse, nuts $\frac{1}{10}$–$\frac{1}{8}$ in. . . . . . . 1. H. LATIFOLIUM.
Glumes acute, nuts $\frac{1}{20}$ in. . . . . . . 2. H. LONGIROSTRE.

1. **H. latifolium,** *Rich. in Pers. Syn.* i. 70 (1805).
*Schœnus nemorum*, Vahl; Moon, Cat. 6. *H. giganteum*, Wall; Nees in Wight, Contrib. 93. Thw. Enum. 346. C. P. 219.
Fl. B. Ind. vi. 678. Bot. Mag. t. 6282 (grown from Ceylon seed).

Stem 2–4 ft., stout, angles acute, smooth; l. much longer than the stem, up to 3 ft. by $1\frac{1}{2}$ in. broad, narrowly lanceolate or ensiform, with straight acuminate points, coriaceous, 3-veined above, margins and keel smooth below, scaberulous above, lower sheaths short, pale; panicle depressed, 2–5 in. broad, branches subwhorled, up to 2 in. long, stiff, spreading, bracteolate at the base, sometimes very short, the infl. becoming capitate; bracts 2–4 in. long; spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., sessile or more or less pedicelled, oblong, cylindric or

globose; glumes $\frac{1}{10}$–$\frac{1}{6}$ in. long, oblong, obtuse, or apiculate, 1-veined, thinly coriaceous, brown; scales 2, obtuse, scarious, keel scabrid; stam. 2–3, fil. long, slender; anth. linear-oblong; ov. as long as the scales, turbinate, with a broad swollen beaked top; style short, stigmas 2 or 3; nut subglobosely trigonous or somewhat compressed, $\frac{1}{10}$–$\frac{1}{8}$ in., very shortly beaked, yellowish or dark brown, epicarp thin, fleshy, endocarp thick, crustaceous, black.

Var. β, **minus,** *Thwaites* l. c. C. P. 3467.

Much more slender, l. narrower, branches of panicle very slender, spikelets $\frac{1}{7}$ in., pedicels $\frac{1}{4}$–$\frac{1}{2}$ in.

Var. γ, **turgidum,** *Hook*, f. *H. latifolium*, Thw. l. c. in part. *H. turgidum*, Clarke in Fl. B. Ind. vi. 679. C. P. 3.

Habit and infl. of the type, but scales 3, the third flat, muticous, not keeled or scabrid, nut rather larger.

Shady places in the moist region up to 3000 ft.; common. Var. γ, moist region, apparently rare, at about 3000 ft. Dikoya (Ambagamuwa Dist.) (Thwaites). Fl. Feb., March.

Also in Travancore, Assam, Nicobar and Andaman Is., Malaya and eastward.

There are Ceylon specimens in Brit. Mus. from Kœnig and from Jonville (1800). I cannot distinguish *H. turgidum* as a species, the nut is so variable in size or shape. Thwaites' var. *minus* is rather a reduced form than a distinct variety.—J. D. H.

2. **H. longirostre,** *Thw. Enum.* 346 (1864).
C. P. 3468.
Fl. B. Ind. vi. 679.

Rootstock small, stem 12–18 in., rather slender; l. longer than the stem, up to 2 ft. by $\frac{1}{2}$ in., narrowly ensiform, acuminate, tips straight, coriaceous, 3-veined above, margins and keel smooth in the lower part, scabrid above, lower sheaths short, pale; panicle 2–3 in. long and broad, irregularly branched, branches $\frac{1}{4}$–$\frac{3}{4}$ in., slender, stiff, divaricate, bracteolate; bracts leafy; spikelets shortly pedicelled, $\frac{1}{4}$–$\frac{1}{3}$ in. long, oblong or ellipsoid, straw-col'd.; glumes $\frac{1}{6}$ in. long, oblong or obovate-oblong, acute; scales 2, concave, acute, keel scaberulous (with sometimes 1 or 2 additional flat scales); nut minute, $\frac{1}{20}$ in. diam., broadly obovoid or subglobose, subcompressed, rugose, brown, shining, beak much longer than the nut, conical, acuminate, white.

Moist low country; very rare. I have seen only the C. P. specimens collected at Hiniduma in 1855 by Thwaites. Fl. May.

Endemic.

### 18. **MAPANIA,** *Aubl.*

Stemless, scapigerous, coarse herbs; rootstock elongate, stout, erect or creeping, root-fibres vermiform; l. very long,

narrow, sheaths subequitant; scapes axillary, much shorter than the l., bearing a single large bracteate capitate spikelet; glumes large, persistent, coriaceous, spirally imbricating, all but the lower flg.; scales 8 or 10, all of about the same length, two outer placed right and left, concave, acute, keeled, keel ciliate, with sometimes a third dorsal, narrow, flat, inner flat or slightly concave; stam. 1 in the axil of each keeled scale, with sometimes a third in the axil of the third scale, fil. slender, anth. linear-oblong; ov. solitary, central amongst the scales, compressed, gradually narrowed into the long persistent slender style, stigmas 3, not long; nut obovoid, pyriform, or globose, beaked by the style.—Sp. 33; 11 in *Fl. B. Ind.*

**M. zeylanica,** *Benth. ex Clarke in Fl. B. Ind.* vi. 682 (1894).
*Pandanophyllum zeylanicum*, Thw. Enum. 345, 433. C. P. 3029.
Fl. B. Ind. l. c. Miq. Fl. Ind. Arch. Ill. t. 22 (*Lepironia*).

Rootstock as thick as the little finger, erect or creeping, root-fibres long, thicker than a crow-quill; l. 2–3 ft. by $\frac{2}{3}$–2 in. broad, subdistichous, narrowed to the base and at the apex into a long filiform point, 3-veined, margins and keel beneath scaberulous or aculeolate, sheaths short, open, very coriaceous; scapes 1–10 in., as thick as a crow-quill, obtusely trigonous, smooth, naked; spikelets $\frac{3}{4}$ in. diam.; bracts oblong, obtuse, shorter than the spikelet; glumes $\frac{2}{3}$ in. long, linear-oblong, obtuse, coriaceous, many-veined, without midrib or keel; scales 5, very narrow, 2 acute, concave, keeled, monandrous, 3 linear-lanceolate, acuminate, flat; anth. $\frac{1}{5}$ in., very slender, obtuse; nut $\frac{1}{4}$–$\frac{1}{3}$ in., ovoid or obovoid, obscurely trigonous, beaked, epicarp thin, olive-green, endocarp bony; seed ovoidly pyriform, testa very hard, thick, black.

By or in water, moist low country below 1000 ft.; rather rare. Kukul Korale; Singhe Raja Forest; Hiniduma Kande; between Kurunegala and Matale. Fl. Sept.–Dec.
Also in Borneo.

2. **M. immersa,** *Benth. ex Clarke in Fl. B. Ind.* vi. 682 (1894).
*Pandanophyllum immersum*, Thw. Enum. 433. C. P. 3819.
Fl. B. Ind. l. c.

Rootstock short, creeping, root-fibres very stout; l. distichous, 2–3 ft. by $\frac{1}{3}$–$\frac{1}{2}$ in., linear, narrowed to the base and at the apex into a long filiform point, 3-veined, margins and keel smooth or nearly so, sheaths short, coriaceous; scapes 1–1$\frac{1}{2}$ in., clothed with imbricating coriaceous sheaths, of which the upper pass into lanceolate, acuminate, or caudate bracts longer than the spikelets, sometimes 2 in. long; spikelets

globose or conical, $\frac{1}{2}$–$\frac{2}{3}$ in. diam.; glumes $\frac{1}{5}$–$\frac{1}{3}$ in., linear-oblong, obtuse, thinly coriaceous; scales $\frac{1}{3}$ in., 2 lateral obtuse, keel narrowly winged; nut $\frac{1}{7}$ in. diam., globose, base suddenly narrowed into a short stipes, and top into a stout acuminate beak.

In running water, very rare, in the moist region below 1000 ft. Singhe Raja Forest; Pasdun Korale. Fl. Sept.

Endemic.

## 19. **SCIRPODENDRON,** *Zipp.*

Rootstock horizontal or ascending; stem scarcely any; l. very long, narrow, caudate; infl. a shortly peduncled bracteate head of spikelets, hidden amongst the l., ped. elongating in fr.; bracts much exceeding the heads; spikelets densely compacted, often 3-nate; glumes large, oblong, obtuse, coriaceous, 1- or more-fld.; scales many, 2 lateral broadest, concave, keeled, keel ciliate, monandrous, inner about 6, some monandrous; fil. elongate, anth. very slender; ov. solitary, central, narrowed into a slender style, stigmas 2, short; nut large, deeply 6–10-grooved.—Monotypic.

**S. costatum,** *Kurz in Journ. As. Soc. Beng.* xxxviii. pt. 2, 85 (1869). [PLATE XCVII.] **Hin-keyiya,** *S.*

*S. pandaniforme*, Zipp. MSS. *Pandanus pumilus*, Moon, Cat. 67. *Hypolytrum costatum*, Thw. Enum. 346. *Chionanthus Ghaeri*, Gaertn. Fruct. i. 190. C. P. 3222.

Fl. B. Ind. vi. 684. Miq., Ill. Fl. Arch. Ind. t. 28 (*S. sulcatum*) (not good). Gaertn. l. c. t. 39.

Rootstock rather slender, clothed with large, acute, imbricating scales, which pass gradually into foliage l., emitting from the under surface long, stout, simple roots; l. very many, up to 10 ft. long by 1–1$\frac{1}{4}$ in. broad, linear, suddenly contracted into a filiform scabrid tail 6–10 in. long, 3-veined, margins and keel aculeolate, or nearly smooth, narrowed below into short coriaceous, slowly imbricating, open sheaths; ped. stout, trigonous, angles smooth, flg. short, frg. up to a foot long; head of spikelets 3–4 in. long, ovoid or subglobose; bracts many, lower 2–4 ft. long, leaf-like, inner broadly oblong with filiform scabrid tips; 'spikelets often in threes, the lateral 1-fld., the median 2–3-fld.'—*Trimen;* glumes $\frac{1}{2}$–$\frac{2}{3}$ in.; nut $\frac{1}{2}$–$\frac{2}{3}$ in. long, ellipsoid, acute at both ends, epicarp fleshy, endocarp bony, very deeply grooved, ribs acute, seeds globose.

Ditches and flooded land near the sea-coast of the moist region; very rare. Kalutara (Moon). Wellewatte, 5 miles S. of Colombo; abundant. Fl. Nov.

Also in Malay Peninsula, Java, Queensland, Samoa.

The leaves are used for mat-making at Colombo.

Kœnig seems to have first collected this; his specimens in Mus. Brit. are labelled 'Sparganium ensiforme.'—*Trimen.*

The above generic and specific descriptions are almost wholly derived from Dr. Trimen's notes, who says that the fl. heads are made the nests of small ants, and are full of water and soil, so that the scales and stamens soon become rotten and pulpy. The maggots of flies live in these and eat the anthers. He adds that the name *S. pandaniforme*, Zipp. MSS., cited by Kurz when publishing the plant as *S. costatum*, should perhaps have the preference.—J. D. H.

## 20. **SCLERIA,** *Berg.*

Perennial, rarely annual, erect, leafy herbs; stem trigonous or triquetrous; l. narrow or broad; spikelets of two forms, androgynous or male, and female, solitary or clustered in the branches of a panicle, mixed with hyaline scales, rarely spicate or capitate; bracts often foliaceous, bracteoles usually filiform; glumes 1-veined; male or androgynous, spikelets narrow, glumes many, 5–6 lower distichous, intermediate convolute, membranous, enclosing many narrowly linear hyaline scales, with 1–3 stam. and one barren ov., anth. narrowly linear, cuspidate; fem. spikelets shorter, broader, 1-fld., glumes 3 or more, distichous, lower 2–3 empty, the next above fertile, the upper empty; disk at the base of the ov., annular, rarely obscure, often enlarged and 3–6-lobed in fr. (cupular in *S. sumatrana*); ov. minute, style slender, stigmas 3; nut globose or oblong, usually white, polished, smooth or sculptured.—Sp. about 250; 29 in *Fl. B. Ind.*

Disk of fem. fl. 0, very small or obscure.
  Spikelets in a single terminal head . . . 1. S. NEESII.
  Spikelets spicate, or in panicled clusters.
    Spikelets in a terminal simple spike . . 2. S. PERGRACILIS.
    Spikelets panicled.
      L. $\frac{1}{2}$–1 in. broad . . . . . . . 3. S. CORYMBOSA.
      L. less than $\frac{1}{4}$ in. broad.
        L. villous . . . . . . . 4. S. JUNCIFORMIS.
        L. glabrous . . . . . . . 5. S. LITHOSPERMA.
Disk of fem. fl. 3-lobed or cupular.
  Disk cupular . . . . . . . . 6. S. SUMATRENSIS.
  Disk 3-lobed.
    Spikelets in small axillary clusters or spikes . 7. S. ZEYLANICA.
    Spikelets panicled.
      Panicles with many long capillary bracteoles.
        Panicle very large, decompound.
          Ligule of l. very short, coriaceous . 8. S. ELATA.
          Ligule of l. longer, scarious . . . 9. S. CHINENSIS.
        Panicle small, sparingly branched.

L. $\frac{1}{10}$–$\frac{1}{5}$ in. broad.
Nut tessellately cancellate . . 10. S. TESSELLATA.
Nut smooth . . . . . . 11. S. HEBECARPA.
L. $\frac{1}{4}$–$\frac{1}{3}$ in. broad . . . . . 12. S. BIFLORA.
Panicles with few or o long capillary bracteoles.
Nuts globose . . . . . . . 13. S. ORYZOIDES.
Nuts on oblate sphere . . . . 14. S. LEVIS.

1. **S. Neesii,** *Kunth, Enum.* ii. 358 (1837). **Bakamunu-tana,** *S.* Thw. Enum. 354. *S. stricta,* Moon, Cat. 62. *Hypoporum capitatum,* Nees in Wight, Contrib. 118. C. P. 3037.
Fl. B. Ind. vi. 688.

Pubescent with soft spreading hairs; rootstock small or o; stems tufted, very slender, 6–12 in.; l. usually many towards the base of the stem, as long as the stem or shorter, erect, linear, $\frac{1}{6}$–$\frac{1}{8}$ in. broad, narrowed from the middle to the base, obtuse or acute, flat, soft, 3-veined, uppermost bract-like, erect, exceeding the head; sheaths slender, closed; spikelets all unisexual, clustered in a terminal, peduncled, hairy, pale head $\frac{1}{2}$–1 in. diam., substellately spreading, bract or uppermost leaf 1–2 in., peduncle $\frac{1}{4}$–$\frac{1}{2}$ in.; fruiting spikelets $\frac{1}{3}$–$\frac{1}{4}$ in., laxly hairy; glumes 4, membranous, 2 lower shorter, long-cuspidate, upper broadly ovate, cymbiform, narrowed into a long acuminate beak; glumes of male spikelets like the fem.; stam. 3, anth. subacute; nut very small, $\frac{1}{20}$–$\frac{1}{16}$ in., globose, echinate, white, disk obscure.

Low country; rather common in swampy places. Fl. Feb.–July, &c.
Also in Borneo. In Bornean specimens more than one head of spikelets occur.

2. **S. pergracilis,** *Kunth, Enum.* ii. 354 (1837). **Méhiwal,** *S.* Thw. Enum. 354. C. P. 827.
Fl. B. Ind. vi. 685.

Annual (?), glabrous, densely tufted; stems 18–30 in., filiform, terminating in a very long simple spike of very small distant clusters of few spikelets; l. longer than the stem, very slender, $\frac{1}{15}$ in. broad, or less, narrowed to the obtuse tip, 3-veined, sheaths long, slender, closed; spikes 6–12 in., rhachis filiform, rather thicker than the stem; clusters of spikelets about $\frac{1}{2}$ in. apart, quite sessile, with a hyaline lanceolate bract at the base as long as the spikelet, and a few smaller hyaline bracteoles; fruiting spikelets about $\frac{1}{10}$ in. long, about 3 in a cluster; glumes membranous, broadly ovate-oblong, upper $\frac{1}{8}$ in. long, apiculate, speckled with red-brown; anth. linear with a pubescent appendage; nut very small, globosely trigonous, $\frac{1}{18}$ in. diam., deeply rugosely cancellate, white, disk obscure or o.

Swampy places in low country; very rare. Alagoda (Gardner); near Nilgala, Uva. Fl. Jan.

Also in India and Trop. Africa.

The leaves are lemon-scented and the crushed plant is used at Nilgala, where they called it 'Méhiwal,' to keep away flies.

3. **S. corymbosa,** *Roxb. Fl. Ind.* iii. 574 (1832).
*S. majus*, Moon, Cat. 62 (ex Clarke). *S. androgyna*, Nees; Thw. Enum. 353. C. P. 3319.
Fl. B. Ind. vi. 686.

Rootstock stout, woody, creeping, root-fibres very stout; stem 3–8 ft., very robust, trigonous or triquetrous, angles scaberulous; l. 2–3 ft. by $\frac{1}{2}$–1 in. broad, acuminate (not narrowed into a long filiform point), 3-veined, margins and midrib smooth or scabrid; sheaths trigonous, closed, mouth truncate with a very narrow scarious border opposite the limb; spikelets very many, fascicled on the spreading trigonous branches and branchlets of long leafy axillary and terminal, subcorymbosely branched panicles 6 in. to 2 ft. long, pale or dark brown; bracteoles filiform, $\frac{1}{2}$ in. long or more, with dilated often pubescent bases; frg. spikelets $\frac{1}{6}$ in. long; glumes 4, broadly ovate, subacute, or outer cuspidate; nut ellipsoid, up to $\frac{1}{7}$ in. long contracted, above the trigonous base, top umbonate, white, smooth, polished, disk-lobes 0.

Moist low country below 1000 ft.; rare. Hiniduma; Katukanda; Kalutara (Moon). Fl. July–Sept.

Also in Khasia, Burma, Malacca.

4. **S. junciformis,** *Thw. Enum.* 354 (1864).
*S. hirsuta*, Moon, Cat. 62; Trim. Syst. Cat. Ceyl. 103. *Cylindropus junciformis*, Nees in Wight, Contrib. 118. *S. pilosa*, Boeck. in Linnæa, xxxvii. 473. C. P. 3225.
Fl. B. Ind. vi. 692.

Rootstock stout, woody, creeping, root-fibres strong; stem 2–3 ft., rather slender, trigonous, smooth; l. as long as the stem or shorter, $\frac{1}{8}$–$\frac{1}{5}$ in. broad, linear, obtuse, rather coriaceous, villous with spreading hairs on both surfaces, 1–3-veined, margins slightly scabrid; sheaths trigonous, lower open, upper closed, villous, mouth truncate, with a short, rounded ligule opposite the limb; spikelets few, erect, in distinct clusters, on a subsimple, solitary, terminal, narrow panicle 2–3 in. long, subtended by a strict, erect, leaf-like bract longer than itself; rhachis pubescent; bracteoles $\frac{1}{2}$–1 in., filiform, recurved; fruiting spikelets $\frac{1}{4}$ in. long; glumes 3, upper lanceolate, acuminate; glabrous or dorsally pubescent; nut ellipsoid, $\frac{1}{6}$–$\frac{1}{5}$ in. long, subumbonate, faintly striate and cancellate, contracted at the base above the trigonous entire disk, white, shining.

Shady woods in moist low country below 1000 ft.; very rare. Kalutara (Moon); Reigam and Pasdun Korales (Thwaites). Fl. Sept.
Endemic.

The bract, simulating a continuation of the stem, gives the panicle the appearance of being lateral.

5 **S. lithosperma,** *Sw. Prod.* 18 (1788).
Moon, Cat. 62. Thw. Enum. 354. C. P. 826.
Fl. B. Ind. vi. 685.

Rootstock hard, elongate, horizontal, nodose, root-fibres slender, wiry; stem $1\frac{1}{2}$–3 ft., very slender, trigonous, leafy, smooth; l. as long as the stem or shorter, narrowly linear, $\frac{1}{20}$–$\frac{1}{12}$ in. broad, narrowed to the obtuse tip, sheaths trigonous, closed, mouth truncate, with a narrow scarious margin opposite the limb; spikelets few, subsolitary, distant on the filiform rhachis and few distant branches of very slender, terminal and axillary, subspiciform panicles, pale or dark brown; bracts and bracteoles very long, capillary; fruiting spikelets $\frac{1}{10}$ in.; glumes broadly ovate, subcuspidately acuminate; disk-lobes 0; nut broadly, ellipsoid, obtusely trigonous, top rounded, smooth, white, polished.

Var. β, Thw. l. c., var. Roxburghii, *Clarke in Fl.B.Ind. l. c.* C. P. 2627.

Fruiting spikelets $\frac{1}{6}$ in., glumes cuspidate, nut globosely trigonous, top apiculate or mucronate, puberulous and minutely tuberculate in waved ridges, white.

Low country; common. Var. β, Haragama. Fl. Nov., Dec., Feb.
In India and all hot countries except Africa.

6. **S. sumatrensis,** *Retz. Obs. Bot.* v. 19 (1789).
Nees in Wight, Contrib. 116. Thw. Enum. 353. C. P. 3783.
Fl. B. Ind. vi. 693. Retz. Obs. Bot. v. t. 2.

Stem tall, stout, leafy, trigonous, $\frac{1}{5}$ in. diam., angles smooth or scaberulous; l. 1–2 ft. by $\frac{1}{2}$–$\frac{3}{4}$ in. broad, narrowed into a slender obtuse point, coriaceous, glabrous or pubescent beneath at the base, where the margins are recurved, uppermost subopposite or subternate, sheaths closed, trigonous, glabrous, or puberulous, mouth truncate, villously ciliate; spikelets $\frac{1}{8}$ in., very many, on the spreading branches and branchlets of large, decompound, oblong, terminal, and subterminal panicles 3–4 in. long, pale brown, solitary, or few in sessile clusters; bracts leaf-like, bracteoles filiform; fruiting spikelets few, $\frac{1}{10}$–$\frac{1}{8}$ in. long; glumes 3, broadly ovate, upper suddenly contracted from a rounded base into an acuminate, cuspidate tip; nut globose, $\frac{1}{10}$–$\frac{1}{8}$ in. diam., sunk for $\frac{1}{2}$–$\frac{2}{3}$ in length in a large, fleshy, cup-shaped, obscurely 3-lobed, crenate disk, closely rugosely pitted, brown.

Moist low country; common.
Also in Bengal, Assam, Burma, Nicobar Is., Malaya.

7. **S. zeylanica,** *Poir. Encycl. Meth.* vii. 3 (1806).
Thw. Enum. 435. *S. lateriflora*, Boeck. in Linnæa, xxxviii. 455, and *S. Thwaitesiana*, Boeck. l. c. 454. C. P. 3318, 3796, 3797.
Fl. B. Ind. vi. 687.

A densely tufted, glabrous, or very sparsely hairy perennial; rootstock small, hard, or 0; stems 6–10 in., slender, leafy; l. as long as the stem or longer, narrowly linear, $\frac{1}{12}$–$\frac{1}{6}$ in. broad, erect, flat or the narrower concave, 3-veined, sheaths closed, trigonous, truncate with a short, obtuse, pubescent ligule opposite the limb; clusters or sometimes short spikes of spikelets small, solitary in the axils of many of the leaves, appearing to be sessile at the mouths of the sheaths, or with the peduncle exserted; fruiting spikelets few in each cluster, about $\frac{1}{6}$ in. long; glumes 3, glabrous or sparsely hairy, upper ovate-oblong, acuminate, shortly cuspidate; disk very short, obtusely 3-lobed; nut globose, smooth or faintly cancellate in vertical lines, white.

Moist low country below 1000 ft.; rather common. Kukul Korale; Ratnapura; Hewesse, &c. Fl. April, July.

Also in Nicobar Is., Burma, and Borneo.

There are three forms of this plant in Herb. Peraden. C. P. 3318 has long, broad, flat, flaccid leaves, like those of *Diplacrum caricinum*, and clusters of very short spikes of spikelets at the mouths of the sheaths. C. P. 3796 has much narrower leaves, but similar infl. to 3318. C. P. 3797 has very long, narrow, concave leaves, about $\frac{1}{16}$ in. broad, and long-peduncled spikes of spikelets.—J. D. H.

8. **S. elata,** *Thw. Enum.* 353 (1864) (chiefly).
Boeck. in Linnæa, xxxviii. 487. C. P. 3030, 3032.
Fl. B. Ind. vi. 690.

Stem tall, stout, leafy, triquetrous, angles scaberulous; l. 1–2 ft. by $\frac{2}{3}$ in. broad, or narrower, narrowed into a long, filiform, obtuse tip, rigid, flat, 3-veined, margins scabrid, sheaths trigonous, or triquetrous, mouth truncate, or produced into a very short rounded coriaceous ligule opposite the blade; spikelets very numerous, pale or dark brown, subsolitary on the branches and branchlets of large, long-peduncled, oblong, decompound, puberulous, leafy panicles 6–10 in. long, branches of panicle and spikelets with capillary bracteoles $\frac{1}{2}$–1 in. long; frg. spikelets $\frac{1}{6}$ in. long; glumes 3, broadly ovate, cuspidately acuminate, glabrous; disk-lobes very short, rounded; nut broadly ellipsoid, subtrigonous, apiculate, $\frac{1}{8}$ in. long, shallowly cancellate, finely puberulous, white.

Moist low region; rather common. Galle; Kalutara; Hiniduma. Fl. Sept., March.

Also in India, Java, and China.

Differs from *S. chinensis* (in so far as Ceylon specimens show) in the

more slender habit, narrower leaves, and well-developed scarious ligule. Of two sheets in Herb. Peraden. one from Hantani and Ambagamuwa has paler spikelets and globose puberulous nuts, the other, from Horton Plains, has very dark and rather larger spikelets, and ellipsoid, glabrous, much larger nuts.—J. D. H.

9. **S. chinensis,** *Kunth, Enum.* ii. 357 (1837), var. **biauriculata,** Clarke, l. c. 690.

*S. exaltata*, Boeck. in Engl. Jahrb. v. 511. *S. elata*, Thw. l. c. (in part). C. P. 825.

Fl. B. Ind. vi. 690.

Stem 2–4 ft., rather slender, trigonous, angles smooth or scaberulous; l. 12–18 in. by $\frac{1}{6}$–$\frac{1}{4}$ in. broad, narrowed into a very long, slender, obtuse tip, flat, 3-veined, margins scaberulous; sheaths long, trigonous, closed, mouth pubescent, with an oblong or rounded scarious ligule opposite the blade; spikelets numerous, pale or dark brown, subsolitary on the spreading branches and branchlets of terminal and subterminal, open glabrous panicles 3–6 in. long; bracteoles capillary; fruiting spikelets $\frac{1}{12}$ in.; glumes 3, broadly ovate, cuspidately acuminate, glabrous; disk-lobes short, rounded; nut globose, $\frac{1}{10}$ in. diam., to broadly ellipsoid, $\frac{1}{8}$ in. long, apiculate, glabrous or puberulous, faintly cancellate in vertical lines, white.

Montane zone; rather rare. Hantane (Thwaites); Ambagamuwa; Horton Plains. Fl. March, Sept., Dec.

Also at Singapore.

10. **S. tessellata,** *Willd. Sp. Pl.* iv. 315 (1805).

Moon, Cat. 62. *S. tessellata*, var. *β*, Thw. Enum. 354. C. P. 3033.

Fl. B. Ind. vi. 686.

Stems 2–3 ft., from a small hard base, rather slender, triquetrous, rigid; l. 10–12 in. by $\frac{1}{10}$ in. or less, linear, subacute or obtusely acuminate, rigid, 3-veined, margins involute, scaberulous, sheaths trigonous, closed, mouth truncate, glabrous; spikelets not numerous, in small clusters on the branches of narrow erect terminal and subterminal, sparingly branched panicles 2–3 in. long, branches of panicle subtended by filiform bracteoles $\frac{1}{4}$–$\frac{1}{2}$ in. long; fruiting spikelets $\frac{1}{10}$ in. long; glumes 3, broadly ovate, acuminate; disk-lobes very small, triangular, obtuse; nut globose, $\frac{1}{12}$ in. diam., tessellately cancellate in vertical lines, puberulous with reddish hairs, top rounded, not beaked, white.

Moist low country below 1000 ft.; rather rare. Kalutara (Moon); Galle (Thwaites); Mawarelle. Fl. Dec.

Also in India, Malaya, Australia, China, and Japan.

Very closely allied to *S. biflora*, and the species are mixed on the sheet of the latter in Herb. Peraden. *S. tessellata* is a much more rigid plant, with narrow leaves, its nut is not mucronate, and the disk-lobes are shorter and broader.—J. D. H.

11. **S. hebecarpa,** *Nees in Linnæa,* ix. 303 (1835). **Goda-karawu,** *S.*

*S. alata,* Moon, Cat. 62. Thw. Enum. 435. Nees in Wight, Contrib. 117. C. P. 3031, 3763.

Fl. B. Ind. vi. 689.

Rootstock woody, nodose, root-fibres stout; stem 2–3 ft., rather slender, rigid, triquetrous; l. 10–12 in. by $\frac{1}{5}$ in. broad or narrower, narrowed to the obtuse tip, flat, 3-veined, rigid, margins scabrous, sheaths trigonous, closed, mouth truncate, with an ovate coriaceous pubescent ligule opposite the blade; spikelets solitary or in small clusters on the suberect branches of narrow, erect, terminal and subterminal, sparingly branched panicles 2–3 in. long, red-brown, branches of panicle and spikelets with filiform bracts $\frac{1}{4}$–$\frac{1}{2}$ in. long; fruiting spikelets $\frac{1}{8}$ in. long; glumes 3, upper broadly ovate, cuspidately acuminate; disk-lobes triangular-ovate, acute, brown; nut globose or broadly ovoid, obscurely trigonous, apiculate, $\frac{1}{10}$–$\frac{1}{8}$ in. long, minutely puberulous, white, polished.

Moist low country; rather common. Fl. Oct., Dec.

Throughout India, Malaya, Polynesia, Australia, China, Japan.

Very near to *S. tessellata,* differing in the smooth, polished, puberulous nut, and in the disk-lobes. A common Indian state has hairy leaves and panicles.—J. D. H.

12. **S. biflora,** *Roxb. Fl. Ind.* iii. 573 (1832).

*S. Steudeliana,* Miq.; Boeck. in Linnæa, xxviii. 475. *S. tessellata,* Thw. Enum. 354. C. P. 3034.

Fl. B. Ind. vi. 687.

Stems tufted, 1–2 ft., rather stout, trigonous, leafy; l. 6–10 by $\frac{1}{4}$–$\frac{1}{3}$ in., ensiform, obtuse or subacute, thin, flat, 3-veined, margins smooth or suberulous, sheaths loose, closed, trigonous, mouth truncate, minutely pubescent opposite the limb; spikelets not numerous, in small clusters on the branches of narrow, slender, erect, terminal and subterminal sparingly branched panicles 2–3 in. long, branches of panicle and lower clusters subtended by filiform bracteoles $\frac{1}{4}$–$\frac{1}{2}$ in. long; fruiting spikelets $\frac{1}{10}$ in. long; glumes 3, broadly ovate, acuminate; disk 3-lobed, lobes broadly ovate, acuminate, about one-fourth the length of the nut; nut globose, $\frac{1}{12}$ in. diam., minutely tessellately cancellate in vertical lines, puberulous with reddish hair, shortly beaked, white.

Moist low country below 1000 ft.; rather rare. Ambagamuwa; Yatiantota; Kukul Korale. Fl. Dec.

Also in Bengal, S. China, Malaya.

13. **S. oryzoides,** *Presl, Rel. Haenk.* i. 201 (1830). **Potu-pan, Potu-kola,** *S.*

*S. latifolia,* Moon, Cat. 62. Nees in Wight, Contrib. 117. Thw. Enum. 353. C. P. 828.

Fl. B. Ind. vi. 691.

Rootstock stout, creeping, woody, stoloniferous, root-fibres very stout; stem 3–6 ft., stout, trigonous or triquetrous, angles smooth below, scaberulous above; l. 3–4 ft. by $\frac{1}{2}$–1 in. broad, narrowly ensiform, tip suddenly acute obtuse or 2-fid, erect, very rigidly coriaceous, 3-veined beneath, the lateral veins sometimes very strong, and the midrib depressed, the l. thus being plicate, finely striate above, margins smooth or scabrid, sheaths very long, triquetrous or 3-winged, closed, mouth truncate, with a narrow scarious membrane opposite the limb; spikelets solitary, distantly spicate on the erect filiform branchlets of an oblong terminal peduncled panicle 4–6 in. long, pale or dark brown; bracteole 0; fruiting spikelets few, about $\frac{1}{6}$ in. long; glumes 3, broadly ovate, subacute; disk very small, obtusely 3-lobed; nut globose, $\frac{1}{12}$–$\frac{1}{8}$ in. diam., obscurely trigonous, smooth, white.

Ponds and wet places in moist low region; common. Fl. Sept., March.

Also in Assam, Burma, Malaya, Philippine Is., Australia, Zanzibar.

14. **S. levis,** *Retz. Obs. Bot.* iv. 13 (1786).

*S. zeylanica*, Moon, Cat. 62 (non Poir.). Nees in Wight, Contrib. 117. Thw. Enum. 354. C. P. 2745.

Fl. B. Ind. vi. 694.

Rootstock stout, creeping, woody; root-fibres stout; stem 2–4 ft., rather stout, acutely trigonous, angles smooth; l. 2–3 ft. by $\frac{1}{6}$–$\frac{1}{3}$ in. broad, narrowed into a long slender obtuse tip, flat, 3-veined, margins scaberulous; sheaths long, trigonous or triquetrous, angles smooth, closed, mouth truncate or very shortly triangular, and pubescent opposite the limb; spikelets numerous, subsolitary on the stiff spreading branches and branchlets of terminal and subterminal oblong panicles 2–6 in. long, dark brown; bracteoles few, short, or 0; fruiting spikelets $\frac{1}{6}$ in. long; glumes 3, broadly ovate, cuspidately acuminate, upper broader than long; disk-lobes broadly ovate, obtuse; nut an oblate sphere, $\frac{1}{8}$ in. diam., smooth, white, polished.

Moist low region below 1000 ft.; rather common. Fl. Aug.

Also in Assam, Burma, Nicobar Is., Malaya, S. China.

Near *S. chinensis* in habit and ligule, differs especially in the oblate nut, and few or 0 capillary bracteoles.—J. D. H.

## 21. DIPLACRUM, *Br.*

A small, tufted, glabrous annual; stem leafy; l. linear; spikelets in small dense axillary clusters at the mouths of the l.-sheaths, minute, unisexual; male spikelets 1–2-fld.; glumes about 3, narrow, membranous; stam. 1–2, anth.

minute; fem. spikelets 1-fld.; glumes 4, distichous, 2 lower cymbiform, empty, upper oblong, 3-lobed, many-veined, side lobes short, incurved, mid lobe stout, subulate; disk obscurely 3-lobed; style slender, stigmas 3; nut globose.—Monotypic.

**D. caricinum,** *Br. Prod.* 241 (1810).

Thw. Enum. 354. *D. zeylanicum*, Nees in Wight, Contrib. 119. *Scleria caricina*, Benth. Fl. Austral. vii. 426. *S. axillaris*, Moon, Cat. 62. C. P. 3035.

Fl. B. Ind. vi. 668 (*Scleria caricina*). Endl. Iconogr. t. 25.

Stem 4–8 in., slender, clothed with the l.-sheaths; l. 1–3, by $\frac{1}{10}$–$\frac{1}{8}$ in., obtuse or subacute, flat, flaccid, 3-veined, radical erect, cauline alt., spreading, sheaths closed, trigonous; clusters of spikelets $\frac{1}{8}$–$\frac{1}{5}$ in. diam., green, ped. enclosed in the l.-sheath; spikelets few in a cluster, $\frac{1}{10}$ in. long; nut $\frac{1}{25}$–$\frac{1}{20}$ in. diam., globose, vertically 3-ribbed, cancellately rugose between the ribs, white.

Moist low country below 1000 ft., in wet places; rather common. Fl. Sept.–March.

Also in India, Malaya, China, Australia.

Included in *Scleria* by most recent authors, but very distinct in habit and in the trifid, many-veined, fruiting glumes. In some Indian specimens the lower clusters of spikelets are panicled.—J. D. H.

## 22. **CAREX,** *L.*

Perennial, glabrous, rarely pubescent, grass-like herbs; stem leafy, chiefly at the base; spikelets solitary, or few, one terminal, the others lower down, rarely all clustered in terminal or axillary panicles or compound spikes, unisexual or androgynous, the lower spikelets fem., with a few male at the base or top, very rarely diœcious, uppermost often wholly male; glumes many, imbricate all round the rhachilla, persistent or deciduous; fl. solitary in the glumes, male of 2 or 3 stam., anth. linear, obtuse; fem. a compressed or triquetrous ov. enclosed in an urceolate 2-toothed sac (utricle), style slender, stigmas 2 or 3 protruding from the sac; nut minute, coriaceous, compressed or trigonous, included in the utricle.—Sp. about 500; 142 in *Fl. B. Ind.*

Stigmas 2, utricle compressed (*Vignea*).
  Terminal spikelet with male and fem. fl.
    Spikelets short, ovoid, or oblong . . . 1. C. NUBIGENA.
    Spikelets cylindric, elongate.
      Utricle scaberulous . . . . . . 2. C. BRUNNEA.
      Utricle glabrous, or nearly so.
        Utricle green . . . . . . 3. C. LONGIPES.
        Utricle brown . . . . . . 4. C. LONGICRURIS.

Terminal spikelet wholly male.
Fem. glumes 2-lobed, awned . . . 5. C. PHACOTA.
Fem. glumes lanceolate, acuminate . . 6. C. ARNOTTIANA.
Stigmas 3, utricle trigonous.
Terminal spikelets, and sometimes lower also, fem. below and male at the top.
Spikelet solitary . . . . . . 7. C. RARA.
Spikelets many.
Utricle more or less spinulose, ciliate, or puberulous.
Spikelets very long, slender . . . 8. C. WALKERI.
Spikelets very short.
Utricle ciliate at the angles . . 9. C. SPICIGERA.
Utricle puberulous all over . . 10. C. LEUCANTHA.
Utricle glabrous (spikelets bipinnately spicate).
Utricle very strongly beaked . . . 11. C. BACCANS.
Utricle long-beaked.
Utricle turgid, suddenly contracted into the beak.
Stem stout, tall.
Spikelets pale brown, opaque . 12. C. INDICA.
Spikelets red-brown, shining . 13. C. LINDLEYANA.
Stem slender . . . . . 14. C. ZEYLANICA.
Utricle lanceolate, gradually contracted into the beak . . . 15. C. FILICINA.
Terminal spikelets wholly male.
Utricle not or shortly beaked.
Spikelets cylindric, dense-fld. . . . 16. C. MACULATA.
Spikelets slender, lax-fld. . . . . 17. C. BREVISCAPA.
Utricle long-beaked.
Utricle tomentose . . . . . . 18. C. LIGULATA.
Utricle glabrous.
Spikelets $\frac{1}{4}$ in., ovoid . . . . 19. C. JACKIANA.
Spikelets 2–4 in., cylindric . . . 20. C. LOBULIROSTRIS.

1. **C. nubigena,** *D. Don in Trans. Linn. Soc.* xiv. 326 (1824).
Thw. Enum. 355. C. P. 2395.
Fl. B. Ind. vi. 702. Boott, Carex, t. 2.

Rootstock small, root-fibres very stout, tortuous; stems $\frac{1}{2}$–$2\frac{1}{2}$ ft., tufted, rather stout, trigonous, smooth, leafy at the base only; l. as long as the stem and shorter, very narrowly linear, $\frac{1}{16}$ in. broad, finely acuminate, erect, complicate, striate, smooth, coriaceous, sheaths short, pale; spikelets sessile, very short, $\frac{1}{4}$–$\frac{1}{3}$ in. long, ovoid, densely or laxly spicate, sometimes forming an oblong terminal head 1 in. long; male fl. at the base of the upper spikelets; lower bracts up to 8 in. long, filiform, upper capillary; fem. glumes $\frac{1}{7}$–$\frac{1}{6}$ in. long, ovate, acuminate cuspidate or awned, awn of the lower sometimes as long as the spikelet; utricle $\frac{1}{8}$–$\frac{1}{6}$ in. long, lanceolate or ovate-lanceolate, flattened, thin, closely many-veined on both surfaces, margins scaberulous, tip acutely 2-fid; nut much

smaller than the utricle, about $\frac{1}{20}$ in. diam., orbicular, plano-convex, apiculate, pale yellow-brown, polished, style longer than the nut, slender, stigmas 2, long.

On the patanas of the upper montane zone; rather common. Fl. Sept.

Also in the Himalayas and Nilgiris, Malaya, China, and Japan.

2. **C. brunnea,** *Thunb. Fl. Japon*, 38 (1784).
*C. gracilis*, Br.; Thw. Enum. 355. C. P. 2632.
Fl. B. Ind. vi. 705. Boott, Carex, tt. 154, 155 (*C. gracilis*).

Rootstock short, with wiry root-fibres; stem 1–3 ft., very slender, leafing above; l. many, as long as the stem and shorter, linear, $\frac{1}{10}$ in. broad or narrower, narrowed into a long capillary point, flat, margins scaberulous, sheaths short, lower dark brown, not shining; infl. long, lax, nodding, sometimes branching from the lowest sheath; spikelets $\frac{1}{2}$–1 in., on long slender peduncles; rhachilla slender; bracts capillary, lower shorter than the infl.; fem. glumes very small, $\frac{1}{16}$–$\frac{1}{12}$ in., rather distant, membranous, from ovate and shorter than the utricle, to lanceolate, long-acuminate, and much longer than the utricle; male fl. at the very slender tops of the terminal spikelets; utricles $\frac{1}{6}$ in., longer or shorter than the glumes, elliptic, compressed, narrowed above into a 2-toothed beak, sometimes as long as the body, and below into a stout stipes, 8–10-veined on both surfaces, sparsely pubescent, dark brown; nut broadly elliptic, filling the body of the utricle, flattened, polished, yellow-brown, style swollen at the base, at length disarticulating, stigmas 2, very long.

Upper montane zone; rather rare. N. Eliya; Horton Plains; Maturata. Fl. Nov.–Feb.

Also in the Himalaya and Nilgiri Mts., and in Mauritius, Australia, Japan, Sandwich Is.

The nut is described in Fl. B. Ind. as suddenly contracted at the top, and the utricle as 9–15-veined and as sometimes glabrous.—J. D. H.

3. **C. longipes,** *D. Don in Trans. Linn. Soc.* xiv. 329 (1824).
Fl. B. Ind. vi. 704.

Rootstock woody, creeping, root-fibres stout, tortuous; stem 18–24 in., very slender, 1–2-leaved above; l. shorter than the stem, 8–16 in. by $\frac{1}{8}$ in. broad or narrower, linear, flat, narrowed into a filiform point, margins scaberulous, lower sheaths short, pale; infl. of few, very distant, very long-peduncled, solitary, pale, few-fld. spikelets $\frac{1}{3}$–$1\frac{1}{4}$ in. long, the upper male at the top, lower ped. up to 4 in. long, filiform; bracts very slender; fem. glumes rather loosely imbricating, broadly ovate, acuminate or shortly awned, sides broadly membranous; utricles longer than the glumes, $\frac{1}{5}$–$\frac{1}{4}$ in., ellipsoid,

biconvex, narrowed above into a scaberulous beak as long as the body, and below into a stipes, 8–9-veined on both faces, membranous, shining; nut broadly ellipsoid or almost orbicular, apiculate, biconvex, sides rounded, style long, base swollen, stigmas 2, shorter than the utricle.

Montane zone (Trimen).

Also in the Himalaya and Khasia Hills and China.

I find a sheet of this very distinct species in the Peradeniya Herbarium ticketed by Dr. Trimen *C. longipes*, Don, and a single specimen on a sheet of *C. brunnea*, ticketed *C. gracilis*, Br.; both sheets are numbered C. P. 2749, but not in Thwaites's hand.

4. **C. longicruris,** *Nees in Wight, Contrib.* 124 (1834).
*C. longipes*, Thw. Enum. 355 (non D. Don). C. P. 2749.
Fl. B. Ind. vi. 705. Boott, Carex, t. 157.

Rootstock small, hard, nodose, root-fibres wiry; stem 1–2 ft., very slender, leafing above; l. many, shorter than the stem, 8–18 in. by $\frac{1}{12}$ in., very narrowly linear, narrowed into a filiform point, flat, margins scaberulous, sheaths short, lower dark brown, not shining; infl. very long, narrow, nodding, rhachis filiform, ped. several from the lower bracts, simple or branched, capillary; bracts very slender, lower 2–3 in., upper capillary; spikelets many, $\frac{1}{2}$–1 in., erect, slender, red-brown, upper male at the top, rhachilla capillary; fem. glumes laxly imbricating, ovate or oblong-lanceolate, acuminate or shortly awned; utricle rather longer than the glume, $\frac{1}{7}$–$\frac{1}{6}$ in., elliptic-lanceolate, narrowed above into a slender, straight beak as long as the body, and below into a stipes, biconvex, about 5-veined on each face, quite glabrous, or margins of beak scaberulous; nut elliptic, rounded at both ends, sides acute, brown, style slender, stigmas 2, very long.

Montane zone above 4000 ft.; rather common. Maturata; Hewaheta, Nuwara Eliya. Fl. Nov., July.

Also in the Himalaya and Nilgiri Hills.

5. **C. phacota,** *Spreng. Syst.* iii. 826 (1826).
Thw. Enum. 356. C. P. 2965.
Fl. B. Ind. vi. 708. Boott, Carex, t. 168.

Rootstock creeping, woody, with stout root-fibres; stem $\frac{1}{2}$–$2\frac{1}{2}$ ft., stout, triquetrous, except at the top, smooth, leafy upwards; l. as long as the stem or shorter, by $\frac{1}{6}$–$\frac{1}{4}$ in. broad, finely acuminate, flat, rigid, margins smooth except towards the tips, lower sheaths coriaceous, pale; infl. short, of 4–6 spikelets; bracts long, lowest leafy, upper filiform; spikelets $1\frac{1}{2}$–$2\frac{1}{2}$ by $\frac{1}{4}$ in. diam., peduncled, cylindric, straight or curved, terminal, slender, rusty-red, wholly male, as are the tips of some of the lower; fem. glumes closely imbricating, squarrosely spreading and recurved in fr., oblong, 2-lobed, with a short,

stout, hispid awn in the sinus, rusty-red, keel green; utricle $\frac{1}{12}$–$\frac{1}{10}$ in., sessile, subtrapezoid, obovoid or ovoid, obtuse, beak 0, strongly compressed, dark purple, veinless, sparsely furfuraceous; nut nearly filling the utricle, ellipsoid, strongly compressed, narrowed above into a short truncate beak, and below into a short stout stipes, smooth, pale brown, style very short, stigmas 2, shorter than the utricle.

Upper montane zone; common. Fl. Aug.
Hills of India, Burma, and Malaya, Japan.

6. **C. Arnottiana,** *Nees ex Drejer, Symb. Caricol.* 16 (1844) (*non Boott*).

Thw. Enum. 356. *C. socia*, Boott in Proc. Linn. Soc. i. 254. C. P. 3219.
Fl. B. Ind. vi. 709. Drejer, l. c. t. 5.

Rootstock small, root-fibres stout; stem 2–3 ft., stout, triquetrous, angles smooth or scaberulous; l. as long as the stem or shorter, nearly $\frac{1}{2}$ in. broad or narrower, flat, finely acuminate, margins and keel scaberulous, lower sheaths coriaceous, pale; infl. elongate, of many long-peduncled spikelets, lower bract long, foliaceous; spikelets 2–4 in. by $\frac{1}{3}$ in. diam., drooping, ped. of lowest 1–3 in., dark brown, cylindric, tips of many contracted, male; fem. glumes closely imbricating, fruiting spreading or subrecurved, lanceolate, acuminate, or awned, dark red-brown, keel green; utricle $\frac{1}{12}$ in., obovoid or nearly orbicular, strongly compressed, rather abruptly narrowed above into a short, truncate, obscurely 2-toothed beak, purplish-black, shoulders subfurfuraceous; nut much smaller than the utricle, orbicular, biconvex, brown, suddenly narrowed above into a very short truncate beak, and below into a stout short stipes, style slender, stigmas 2, shorter than the utricle.

Upper montane zone; common. Fl. April.
Endemic.

7. **C. rara,** *Boott in Trans. Linn. Soc.* xx. 139 (1846).

Thw. Enum. 354. C. P. 3080.
Fl. B. Ind. vi. 713. Boott, Carex, t. 109.

Rootstock very short, slender; stems 6–20 in., densely tufted, filiform, leafless except towards the base, triquetrous; l. as long as the stem or shorter, filiform, flexuous, channelled along the upper surface, scaberulous towards the narrowed obtuse tip, sheaths very short, membranous, pale; spikelets $\frac{1}{4}$–$\frac{1}{3}$ in., solitary, ovoid, pale, male at the top; fem. glumes not numerous, broadly ovate or oblong, obtuse, hyaline, 3-veined in the middle; utricle longer than the glumes, $\frac{1}{16}$–$\frac{1}{12}$ in. long, ovoid or ellipsoid, subtrigonous, strongly veined, narrowed

above into a short 2-fid beak, and below into a short, stout stipes, smooth, pale; nut nearly as long as the utricle, narrowly oblong, trigonous, narrowed above into a long beak, and below into a short stipes, pale, smooth, style short, stigmas 3, about as long as the utricle.

Upper montane zone above 6000 ft.; rather common. Fl. Jan., Feb.
Also in the Himalayas and in Japan, Borneo, and Australia.
Spikelets in Indian specimens $\frac{1}{2}$–$\frac{3}{4}$ in. long.

8. **C. Walkeri,** *Arn. ex Boott in Proc. Linn. Soc.* i. 257 (1849).
Thw. Enum. 355. Boott, Carex, i. 2. C. P. 2751.
Fl. B. Ind. vi. 725. Boott, l. c. t. 4.

Rootstock creeping, woody, with very stout root-fibres; stem stout, 2–3 ft., high, trigonous, leafy upwards; l. as long as the stem or shorter, up to $\frac{1}{3}$ in. broad, narrowed into a very long filiform tip, rigidly coriaceous, scabrid, strongly keeled, sheaths coriaceous, basal purplish-red; infl. 12–18 in., panicled, spikelets very many, from the upper sheaths, long-peduncled, subcorymbosely clustered, 1–3 in. long, very slender, dark chestnut-brown, shining, peduncles and rhachilla capillary; bracts leafy, scabrid, lowest shorter than the infl.; fem. glumes laxly imbricate, suberect, oblong or linear-oblong, obtuse with a long scabrid dorsal awn inserted below the tip; utricles $\frac{1}{3}$–$\frac{1}{4}$ in., longer than the glumes, lanceolate, narrowed into a long acutely 2-fid flattened beak, straight or falcately recurved, trigonous, smooth, veinless, lateral angles and beak spinulose, dorsal angle smooth; nut narrowly ellipsoid, trigonous, pale, narrowed upwards into a rough style longer than itself, and below into a stipes, stigmas 3, shorter than the beak of the utricle.

Montane zone, above 4000 ft.; rather common. Hantane; Ambagamuwa; Maturata; Pedurutalagala. Fl. Feb., April, Sept., Oct.
Also in the Nilgiri Hills.

9. **C. spicigera,** *Nees in Wight, Contrib.* 121 (1834).
Boott, Carex, i. 10. Thw. Enum. 355. C. P. 822.
Fl. B. Ind. vi. 722. Boott, l. c. t. 29.

Rootstock hard, creeping, stoloniferous, with copious wiry root-fibres, stems 6 in. to 2 ft., leafy upwards, rather stout, or slender; l. narrowly linear, $\frac{1}{7}$ in. broad or less, many longer than the stem, finely acuminate, rigid, scaberulous, basal sheaths chestnut-brown; spikelets short, ovoid or globose, $\frac{1}{8}$–$\frac{1}{4}$ in. long, panicled or collected in dense lobed heads, all fem. or uppermost male at the top; lower bracts foliaceous, much longer than the infl.; fem. glumes much shorter than the utricle, broadly oblong or orbicular-ovate, obtuse or acute, rarely awned; utricle ellipsoid, $\frac{1}{12}$–$\frac{1}{10}$ in. long.

Var. **minor,** *Thw.; Fl. B. Ind.* l. c. C. P. 824.

Stem 6–10 in. high, densely tufted, l. very narrow, spikelets small, often depauperate, with very few shortly beaked pale utricles $\frac{1}{12}$ in. long.

Var. **rubella,** Clarke in Fl. B. Ind. l. c. *C. spicigera*, var. *β*, Thw. l. c. *C. rubella*, Boott, l. c. iv. 176, and t. 599. C. P. 2966.

Tall, rather stout, spikelets crowded in ovoid lobed heads, utricle dorsally compressed, orbicular or very broadly obovate, obtuse, beak 0.

Var. **rostrata,** *Boeck. in Linnæa*, xl. 369. C. P. 2629. *Fl. B. Ind.* l. c.

Tall, slender, spikelets crowded on short axillary peds., utricle ovate-lanceolate, narrowed into a bifid beak, nut chestnut-brown.

Moist region up to 6000 ft.; common, especially in the lower montane zone. Var. *minor*, montane zone, 4–7200 ft., Ramboda; Dimbula; Pedurutalagala. Var. *rubella*, Maturata. Var. *rostrata*, N. Eliya. Fl. Oct., March.

Endemic.

I suspect that *C. exigua*, Boeck., in Engl. Jahrb. v. 524 (1884), from Ceylon, is included in var. *minor*. There is a specimen from him collected in 1862 in Pedra, whence also came his specimen from Wichura, n. 2690, cited in Fl. B. Ind. vi. 748.—*Trimen.*

10. **C. leucantha,** *Arn. ex Boott in Proc. Linn. Soc.* i. 257 (1849).
Thw. Enum. 355. C. P. 2631.
Fl. B. Ind. vi. 721. Boott, Carex, t. 28.

Rootstock woody, creeping; stems 1–2 ft., slender, leafless upwards (except for the bracts), trigonous, angles scaberulous; l. longer and shorter than the stem, very narrow, $\frac{1}{8}$ in. broad and less, rigid, scabrid, narrowed into long slender points, basal sheaths dirty brown; infl. very long, of very distant, small, pale, clusters $\frac{1}{2}$ in. long and less, of shortly peduncled few-fl., sessile, ovoid spikelets $\frac{1}{6}$–$\frac{1}{4}$ in. long; bracts leafy, lower overtopping the infl.; fem. glumes ovate or ovate-lanceolate, acuminate, awned, awn long or short; utricles about as long as the glumes with their awns, $\frac{1}{5}$–$\frac{1}{4}$ in. long, turgid ovoid or obovoid, trigonous, many-veined, puberulous, suddenly narrowed into a flat 2-toothed scabrid beak as long as the body or nearly so, pale, not shining; nut ellipsoid, trigonous, pale, style conical at the base, puberulous, stigmas 3.

Moist low country, 1–3000 ft.; rather rare. Matale; Kurunegala; Belihul-oya. Fl. Feb., Nov., Dec.

Also in S. India.

11. **C. baccans,** *Nees in Wight, Contrib.* 122 (1834).
Thw. Enum. 355. C. P. 821.
Fl. B. Ind. vi. 722. Boott, Carex, ii. tt. 234–239. Bot. Mag. t. 7288.

Rootstock short, stout, horizontal; stem 2–3 ft., stout,

trigonous, leafing upwards, angles smooth; l. longer and shorter than the stem, $\frac{1}{3}$ in. broad or narrower, tip long, filiform, rather softly coriaceous, margins smooth or scaberulous, sheaths long, coriaceous; infl. 12–18 in. long, panicled, peduncles stout, bearing simple or compound (bipinnate) spikes of divaricate (when ripe) spikelets; bracts leafy, overtopping the infl.; spikelets $1\frac{1}{2}$–2 in., stout, mostly contracted and male at the tip, the male portion often as long as the fem., dark brown, rhachilla stout, glabrous; fem. glumes very broadly ovate or oblong, obtuse, acute, or mucronate; utricles longer than the glumes, $\frac{1}{8}$–$\frac{1}{4}$ in. long, ovoid or oblong, obscurely trigonous, suddenly or gradually contracted into a short bifid beak, coriaceous or fleshy, many-veined, glabrous or obscurely scaberulous towards and on the beak, when dry shrivelled, plicate, and many-ribbed; nut very narrowly oblong- or elliptic-lanceolate, acutely trigonous, narrowed above into a very short style, and below into a short stipes, dark brown, opaque, stigmas 3, short.

Montane zone up to 6000 ft.; common. Fl. April–June; utricles red in the larger states.

Himalaya and Nilgiri Mts., Java, China, Philippine Is.

Very variable in the size and texture of the utricle.

12. **C. indica,** *L. Mant. II. App.* 574 (1771).

Boott, Carex, ii. 87. *C. bengalensis*, Thw. Enum. 355 (non Roxb.). C. P. 2628.

Fl. B. Ind. vi. 714. Boott, Carex, t. 251 (from a Ceylon specimen).

Rootstock stout, woody, crowned with black fibrous remains of l.-sheaths; stem 2–$2\frac{1}{2}$ ft., stout, trigonous, leafing upwards, angles smooth; l. longer and shorter than the stem, up to $\frac{3}{4}$ in. broad, finely acuminate, margins scabrid, lower sheaths compressed; infl. 12–18 in. long, panicled, peduncles stout or slender, bearing short, simple, or compound (bipinnate) spikes of divaricate (when ripe) spikelets; bracts leafy, lower overtopping the infl.; spikelets many, $\frac{1}{4}$–$\frac{3}{4}$ in., pale brown, not shining, with a short or long terminal male portion, rhachilla rather stout, pubescent; fem. glumes very variable, in some specimens $\frac{1}{8}$ in., ovate-lanceolate, acute, acuminate, or very shortly awned, in others shorter, broadly oblong, very obtuse, or rounded at the top with a very long or a short slender awn; utricles longer than the glumes, divaricate, $\frac{1}{10}$–$\frac{1}{6}$ in., turgidly often gibbously ovoid, obscurely trigonous, many-veined, suddenly contracted into a slender, 2-toothed, smooth beak, from $\frac{1}{2}$ as long to as long as the body; nut broadly ellipsoid, trigonous, pale, obtuse at both ends, style long, base conical, truncate, stigmas 3, short.

Moist region up to 4000 ft.; common. Fl. Feb., March.

Also in E. Bengal, Burma, Malaya, Nicobar Is., Polynesia.

There are two forms of this species in Herb. Peraden.; one, *læte-brunnea*, Clarke in Fl. B. Ind., with ovate-lanceolate, acuminate, or shortly awned glumes and large utricles, the other with short, broad, very long-awned glumes and smaller utricles, intermediates occur.—J. D. H.

13. **C. Lindleyana,** *Nees in Wight, Contrib.* 121 (1834).
*C. cruciata*, Thw. Enum. 355 (part) (non Wahlb.). C. P. 3161.
Fl. B. Ind. vi. 721. Boott, Carex, t. 34 (*C. thyrsiflora*).

Rootstock short, woody, stoloniferous, root-fibres stout; stem 6–24 in., stout or slender, trigonous, angles smooth, leafy; l. shorter than the stem, broad (up to $\frac{1}{2}$ in.) or narrow, acuminate, softly coriaceous, margins smooth, lower sheaths pale; infl. of 2 forms, elongate, 6–12 in., bipinnately branched peduncles with divaricate spikes and spikelets, or infl. short, consisting of peduncled, ovoid or oblong, lobed fascicles of crowded spikelets; bracts leafy, lower shorter than the infl.; spikelets $\frac{1}{4}$–$\frac{1}{3}$ in., chestnut-brown, shining, most of them with concolourous male tips; fem. glumes shorter than the utricles, ovate or oblong, subacute, rarely cuspidate; utricle spreading, $\frac{1}{8}$–$\frac{1}{6}$ in. long, straight or curved, ovoid or ellipsoid, trigonous, many-veined, narrowed into a compressed bifid, flattened beak as long as the body, margins of beak smooth or scabrid, very young sparsely hairy; nut ellipsoid, obtuse, trigonous, pale brown, style as long as the nut, stigmas 3, rather long.

Upper montane zone, on the patanas; very common, ascending to 7200 ft. Fl. Sept., Dec., Feb.

Also in the Nilgiri Hills.

Differs from *C. indica* in the smaller size, chestnut-brown shining spikelets of most specimens, soft small foliage, and never awned fem. glumes. The difference in the infl. of two forms of this species is great, in one the peduncles bear triangular panicles up to 2 inches broad, of bipinnately arranged spikelets; in the other, the infl. is in dense oblong fascicles, 1–1$\frac{1}{2}$ in. long. There are also in both forms considerable difference in the utricle, from ellipsoid with a straight beak to narrower, decurved, and approaching that of *C. filicina.* Neither Thwaites nor Trimen, however, seemed to have regarded these forms as varieties.—J. D. H.

14. **C. zeylanica,** *Boeck. in Linnæa*, xl. 341 (1876) (*ceylanica*).
*C. cruciata*, Thw. Enum. 355 (in part) (non Wahlb.). *C. filicina*, var. (?) *microgyna*, Clarke in Fl. B. Ind. vi. 718 (the Ceylon plant only). C. P. 820 (in part).
Fl. B. Ind. vi. 719.

Rootstock woody, creeping, root-fibres very stout; stems tufted, slender, 6–18 in., trigonous, leafing upwards; l. shorter than the stem, 3–10 in., up to $\frac{1}{4}$ in. broad, acuminate (tips not finely attenuate), flat, margins smooth, lower sheaths short, red-brown; infl. of few simple spikelets, or panicles of loosely spicate red-brown spikelets $\frac{1}{4}$–$\frac{3}{4}$ in. long, many with male at

the top; rhachis hispidulous; bracts leafy; fem. glumes $\frac{1}{12}$–$\frac{1}{10}$ in., loosely imbricate, ovate or ovate-lanceolate, acuminate, membranous; utricles one-third longer than the glumes or more, $\frac{1}{7}$–$\frac{1}{6}$ in. long, straight or decurved, ellipsoid, trigonous, narrowed into a flattened bifid beak about as long as the body, sides strongly veined, glabrous; nut ellipsoid, trigonous, pale brown, style as long as the nut, stigmas 3, short.

Upper montane zone, '6000 ft.' Maturata (Thwaites). Fl., Oct., June.

Endemic.

I think that this will prove to be only a mountain form or reduced condition of *C. Lindleyana*, but a much larger number of specimens and from different localities is requisite to prove this. Dr. Trimen referred it to *C. filicina*, of which, but for the much larger glumes, it might be regarded as a reduced form. The utricles vary in different and even in the same individuals, from straight with a tumid body suddenly contracted into the beak, as in *C. Lindleyana*, to curved with a narrower body passing gradually into the beak, as in the Ceylon *C. filicina*. The Ceylon plant included by Clarke under var. (?) δ of *C. filicina* is certainly *C. zeylanica*.—J. D. H.

15. **C. filicina,** *Nees in Wight, Contrib.* 123 (1834).
Boott, Carex, iii. 105. *C. cruciata*, Vahl; Thw. Enum. 355 (part) (non Wahlb.). C. P. 820 (part).
Fl. B. Ind. vi. 717. Boott, Carex, t. 311.

Rootstock short, hard; stem 1–3 ft., stout or slender, trigonous, angles smooth, leafy upwards; l. shorter than the infl., ensiform, up to $\frac{2}{3}$ in. broad, or narrowly linear, finely acuminate, softly coriaceous, margins smooth or scaberulous, lower sheaths pale; infl. 10–16 in., rhachis slender, peduncles bearing triangular compound (bipinnate) spikes of horizontally spreading spikelets, peduncles, branches, and branchlets filiform; bracts leafy, lower shorter than the infl.; spikelets $\frac{1}{4}$–$\frac{1}{2}$ in., pale brown, not shining, mostly with concolourous male tips; rhachilla exposed, very slender; fem. glumes distant, minute, $\frac{1}{16}$ in. long, ovate, acute, spreading; utricles much longer than the glumes, $\frac{1}{8}$–$\frac{1}{7}$ in. long, narrowly ellipsoid, or lanceolate, strongly decurved, gradually narrowed into a beak as long as the body, trigonous, strongly veined, smooth; nut ellipsoid, trigonous, style long, stigmas 3, rather long.

Lower montane zone in shady places; common. Elk Plains, 6500 ft. (Pearson). Fl. June.

Also in Nilgiri Hills, China, and Java.

Differs from *C. Lindleyana* in the minute fem. glumes and narrow utricle.

16. **C. maculata,** *Boott in Trans. Linn. Soc.* xx. 128 (1846).
Boott, Carex, i. 9. Thw. Enum. 355. C. P. 2630.
Fl. B. Ind. vi. 735. Boott, l. c. t. 26.

Rootstock shortly creeping, root-fibres tortuous; stems

tufted, 6–16 in., slender, leafy, trigonous, angles smooth; l. longer and shorter than the stem, erect, narrowly ensiform, $\frac{1}{6}$ in. broad or narrower, acuminate, flat, glaucous, margins smooth, basal sheaths membranous; spikelets 1–1$\frac{1}{2}$ in., solitary or rarely 2 in one sheath, lower long-peduncled, erect, cylindric, $\frac{1}{5}$ in. diam., almost black, uppermost wholly male; bracts leafy, longer than the infl.; fem. glumes closely imbricate, broadly ovate, obtuse or acute, dark brown, keel green; utricles $\frac{1}{12}$-$\frac{1}{10}$ in., longer than the glumes, very broadly ovoid or almost orbicular, strongly dorsally compressed, obscurely trigonous, strongly veined, puberulous or subfarinose, dark brown, beak 0 or very short; nut ellipsoid, trigonous, subacute at both ends, style short, stigmas 3, short.

Upper montane zone; rather rare. Adam's Peak (Moon); Ambagamuwa; N. Eliya; Horton Plains. Fl. Feb., March.

Also in the Khasia and the Nilgiri Hills, and in Australia, Japan, and Korea.

17. **C. breviscapa,** *Clarke in Fl. B. Ind.* vi. 736 (1894).

*C. Jackiana*, var. *β*, *breviculmis*, Thw. Enum. 356. C. P. 3781.

Rootstock short, root-fibres wiry; stem 2–6 in., leafy, concealed in the l. sheaths, the infl. only exposed; l. 1–2 ft. by $\frac{1}{6}$–$\frac{1}{4}$ in. broad, overtopping the infl., erect, narrowly ensiform, acuminate or caudate, flat, striate, margins smooth or scaberulous, midrib very slender; lower sheaths pale brown; infl. narrow, lower peduncles short with 2–3 spikelets; bracts leafy, lower nearly as long as the leaves; spikelets $\frac{1}{2}$–1 in., close together, so as to appear fascicled, striate, erect, green, uppermost slender male overtopped by the longer lower fem., rhachilla stout, angular; fem. glumes loosely imbricate, erect, broadly ovate-oblong or nearly orbicular, shortly awned; utricle erect, $\frac{1}{7}$–$\frac{1}{6}$ in. long, ovoid, trigonous or subterete, many-veined, constricted above the middle, the upper third conical and narrowed into a bifid beak; nut filling the utricle, trigonous, faces convex, narrowed from the swollen middle upwards to a broad truncate flat top, and downwards to a pyramidal base, pale brown, smooth, polished, style about half as long as the nut, stigmas 3, rather short.

Moist country in lower montane zone; very rare. I have seen only the C. P. specimens collected by Thwaites in Ambagamuwa in 1862. Fl. Sept.

Endemic.

A very abnormal species.

18. **C. ligulata,** *Nees in Wight, Contrib.* 127 (1834).

*C. breviculmis*, Thw. Enum. 356 (non Br.). *C. Thwaitesii*, Hance in Journ. Bot. v. 235; Trim. Syst. Cat. Ceyl. 104. C. P. 2750.

Fl. B. Ind. vi. 747. Boott, Carex, i. t. 113.

Rootstock short, nodose, stoloniferous, root-fibres wiry; stem 1–2½ ft., tufted, rather stout, leafy above, below hard, acutely trigonous, clothed with long brown sheaths, bearing very short blades; l. from above the middle, and as long as the stem or longer, ½ in. long or narrower, linear, finely acuminate, tip filiform, flat, thin, midrib very slender, margins and upper surface scaberulous; infl. 6–10 in. long, spikelets 1–2 in. by ¼ in. diam., solitary, peduncles shortly exserted from the sheaths, erect, green, terminal very slender, pale brown, wholly male, rhachilla rather stout, angular; bracts long, leafy, far exceeding the infl.; fem. glumes ovate or oblong, acuminate or shortly awned, membranous; utricles about one-third longer than the glumes, suberect, $\frac{1}{7}$ in. long, obovoid or ellipsoid, trigonous, narrowed into a bifid beak ¼–⅓ the length of the body, coriaceous, densely tomentose, veins obscure; nut ellipsoid, trigonous, pale brown, style shorter than the nut, base swollen, conical, stigmas 3, rather short.

Montane zone; rare. Hewaheta; Maturata; Haputale. Fl. Sept.–Nov.

Also in the Himalayas and Nilgiris, and in China and Japan.

19. **C. Jackiana,*** *Boott in Proc. Linn. Soc.* i. 260 (1849).
Thw. Enum. 356 (excl. var. β). C. P. 3198.
Fl. B. Ind. vi. 735. Boott, Carex, t. 25.

Rootstock hard, nodose, root-fibres slender; stem 1–2 ft., slender, leafless or nearly so, weak, flexuous, smooth; l. longer and shorter than the stem, ⅙ in. broad or narrower, acuminate, narrowed to the base, flat, thin, margins smooth or scaberulous, lower sheaths brown; infl. various; spikelets green, solitary on filiform radical peduncles, sometimes 6 in. long, or 2–4 spikelets sessile in the axils of a bract, or solitary spikelets peduncled in the axils of one or two bracts towards the top of the stem, or 2–3 spikelets clustered at the mouth of a terminal bract, terminal spikelet slender, pale brown, wholly male; bracts leafy; spikelets ¼–½ in., few-fld.; fem. glumes ⅛ in., membranous, broadly ovate or oblong, obtuse, acute or shortly awned, 3-veined; utricle ⅕–¼ in. long, obovoid or ellipsoid, trigonous, substipitate, gradually narrowed into a bifid beak as long as the body or shorter, strongly many-veined, quite smooth and glabrous; nut obovoid, trigonous, pale brown, stipitate, minutely beaked, style short, stigmas 3, rather long.

* Commemorates William Jack of the Bengal Medical Service, who collected and described many Malayan plants. Died 1822.

Var. **minor,** *Clarke in Fl. B. Ind.* l. c.

Stems 6–10 in., filiform, l. very much longer than the stem, very narrow, $\frac{1}{10}$–$\frac{1}{6}$ in. broad, spikes depauperate, few-fld., utricle $\frac{1}{3}$ in. long.

Upper montane zone; rare. N. Eliya; Horton Plains. No habitat is given for var. *minor.* Fl. Feb.

The type is found in Java, Khasia, and Japan; the var. in the Nilgiri Hills.

In Herb. Kew. small specimens of the true *C. Jackiana* are included under var. *minor.* These have broad leaves and normal spikes, whereas in true var. *minor* the l. are very narrow. In Herb. Peraden. a small specimen of true *minor* is on the same sheet as the typical plant, and a second specimen is on another sheet without locality. It is probably a native of the montane zone. The Ceylon specimens of *minor* precisely accord with others gathered at Conoor in the Nilgiri Hills, alt. 7000 ft., by Mr. Clarke. Boeckeler regarded it as a distinct species, and it certainly looks very different, but more specimens are wanted to determine this point.—J. D. H.

20. **C. lobulirostris,** *Drejer, Symb. Caric.* 27 (1844).

*C. Arnottiana,* Boott in Trans. Linn. Soc. xx. 129 (non Drej.). Thw. Enum. 356. C. P. 2633.

Fl. B. Ind. vi. 741. Drejer, l. c. t. 14.

Rootstock stout, horizontal, root-fibres stout; stem 2–3 ft., stout, leafy throughout, trigonous, smooth; l. overtopping the stem, up to $\frac{3}{4}$ in. broad, finely acuminate, margins smooth or scaberulous, brown when dry; lower sheaths compressed; spikelets 4–6, sessile or shortly peduncled close to the top of the stem, $1\frac{1}{2}$–$3\frac{1}{2}$ in. long, cylindric, $\frac{1}{4}$–$\frac{1}{2}$ in. diam., very dark brown, terminal as long, slender, pale brown, all male; bracts leafy, longer than the spikes; fem. glumes small, ovate or ovate-lanceolate, acuminate or awned; utricle spreading, ovoid or obovoid, $\frac{1}{6}$ in. long, stipitate, strongly veined, suddenly narrowed into a slender 2-toothed beak as long as the body or shorter, smooth, dark brown; nut ellipsoid, trigonous, apiculate, pale brown, style about as long as the nut, slender, stigmas 3, short.

Upper montane zone; rather rare. Nuwara Eliya; Elk Plains; Horton Plains. Fl. Feb.

Endemic.

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## CXLIX.—GRAMINEÆ

HERBS or (*Bambuseæ*) shrubs or trees, annual with fibrous roots, or stem (*culm* of many authors) arising from a perennial creeping rarely tuberous rootstock, terete or compressed, jointed, internodes hollow or solid; l. simple, usually long, narrow, entire, veins parallel, sheath distinct from the blade, with a membrane or ridge of hairs (ligule) at the junction,

split to the base, rarely entire; infl. of spicate* racemed, capitate, or panicled spikelets, formed of 3 or more alt. distichous bracts (glumes), two lowest glumes almost invariably empty, one or more following 1-fld., if more than one, all are inserted on an axis (rhachilla); opposite to each flg. glume, and often to empty ones, is a 2-veined usually membranous scale (palea) with often inflexed sides (flaps); perianth 0, or of 2, rarely more, minute scales (lodicules); stam. 3, rarely 1–2 or many, hypogynous, one at the base of the flg. glume, one opposite each vein of the palea, fil. capillary, anth. of 2 parallel cells, connective obsolete, pollen globose; ov. 1-celled, styles usually 2, terminated by feathery or penicillate stigmas, ovule erect, anatropous; fr. (grain) a seed enclosed in and usually adnate to a membranous pericarp which is rarely loose, or coriaceous, or (in some *Bambuseæ*) fleshy; seed erect, hilum posticous, punctiform orbicular or linear, embryo anticous, at the base of but outside the copious floury albumen, sometimes half as long as the seed, cotyledon large, shield-like (scutellum), dorsally adnate to the albumen, plumule and radicle small.

The following Key to the tribes and genera of Siṇhalese grasses is rather a compromise adapted to the wants of a colonist than a strictly scientific co-ordination. In drawing it up I have adhered pretty closely to that given for the whole Order by Bentham (Gen. Plant.), as slightly modified in the Flora of British India. The few important changes (indicated where they occur) are chiefly due to the later revision of some of the tribes by Dr. Stapf, prepared for the Flora Capensis (ined.). I have not, however, adopted all the views of that able student of grasses, deeming that some of them want further consideration. It must be allowed, I think, that there is no more difficult problem in the classification of the genera of any large order of phanerogams than that which the grasses present. The primary divisions of *Panicaceæ* and *Poaceæ* is a very unsatisfactory one, though founded primarily on such apparently important characters as the relative position of the fertile flowers on their axis of growth (the rhachilla), and that of the spikelets being articulate or not at the base, whereupon depends in a great degree the dispersion of the seeds. Of the recognised tribes, some are more or less artificial, containing genera of doubtful affinity; nor, as it appears to me, would it be difficult to multiply the tribes indefinitely, by giving tribal value to anomalous genera. On the other hand, the genera themselves are, on the whole, well circumscribed. Though some are divisible into sections

* The term 'spike' is loosely used in this Order, or is more or less conventional. In some genera with contracted infl., the pedicels are so short that the spikelets are sessile or subsessile, when the term is legitimate; in others, where the spikelets are binate, a sessile and a pedicelled, the terms 'spikes' and 'raceme' are interchangeable.

which may be regarded as genera, these as such do not disturb the classification by being referable to other tribes.

As stated in the Preface to Part IV., no materials were left in MS. by Dr. Trimen for the elaboration of the grasses, my resources are hence limited as regards habitats, colours, and flowering seasons. For the former I am dependent on those given in Thwaites's 'Enumeratio' in the Peradeniya Herbarium, where unfortunately many species have no habitat or date of collection assigned to them, and especially in the late Mr. Ferguson's valuable essays on the grasses of Ceylon.* I am also indebted to Mr. H. H. W. Pearson for the loan of his carefully ticketed collection of grasses, made chiefly in the patanas of the island in 1898. For the flowering seasons of the grasses I am altogether deficient of resources. As with the *Cyperaceæ*, they would seem, from such dates as I find attached to some specimens, to be either greatly prolonged, or to occur twice in the year, dependent on the monsoons, the wet and dry climates, elevation above the sea, and exposures. A full account of the distribution and flowering seasons of the Ceylon grasses could not fail to be both instructive and interesting. The two charts issued with this Part of the Handbook, of the rainfall and forest regions of the island, indicate data as to climate and geographical areas, available for an essay on this subject.

Series I. **Panicaceæ.**—Spikelets usually articulate on their pedicels and deciduous from them when in fr., rarely persistent and deciduous with them, binate, a sessile fruiting and a pedicelled male or neuter, rarely solitary; glumes 3 or 4, rarely only 2, rhachilla of spikelets rarely produced between the bases of the glumes or beyond the upper glume; sessile spikelets 1–2-fld. (never more), upper fl. alone (if 2) fruiting —Herbs, *Spinifex* alone shrubby of Ceylon genera.

*Exceptions.*—Spikelets persistent or tardily deciduous, or glumes I and II separately deciduous in *Isachne*, *Chamæraphis*, *Pennisetum*, *Stenotaphrum*, *Thuarea*, *Arundinella*, and *Zoysia*. Spikelets inarticulate at the base and deciduous with the internodes of a fragile rhachis in many *Andropogoneæ*. Both fls. of the spikelet of some species of *Isachne* ripen fruit.

Spikelets articulate on their pedicels and deciduous occur in *Poaceæ*, in *Garnotia*, *Polypogon*, *Sporobolus*, and *Lophatherum*. Lower fl. in the spikelet male and upper fertile, occur in *Phragmites*, &c.

A. Rhachis or branches of infl. inarticulate; pseudo-articulate in *Stenotaphrum*, articulate in *Trachys*. Some genera of Tribe *Andropogoneæ* have inarticulate branches, racemes, or spikes.

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* 'Notes on the Grasses and their Distribution in Ceylon, by W. Ferguson, F.L.S., read before the Ceylon Branch of the Royal Asiatic Society (1880).' I have seen no copy of this paper, only a *précis* of its contents kindly made for me by Mr. Lewis of the Forest department. 'Gramineæ or Grasses Indigenous to or Growing in Ceylon, with Notes especially on those used as Fodder Plants, by W. Ferguson, F.L.S. Colombo, 1886.' I have made much use of this instructive work, though perhaps not all that I might have, had I seen corresponding specimens that would have certified the nomenclature of some of the critical species. Mr. Ferguson's list embraces 218 species, including those known only in cultivation.

Tribe I. **Paniceæ.**—Fruiting glume coriaceous, usually hardening and enclosing the ripe grain; hilum punctiform.

* Annual or perennial bisexual herbs.

† Spikelets articulate on their persistent pedicels (obscurely in *Chamæraphis*).

§ Spikelets not awned, except glume I of *Panicum Crus-galli*, and *Chamæraphis*, glume IV minutely awned in *Pan. ambiguum*, *setigerum*, and *javanicum*), and in *Eriochloa*.

Glumes 3, I and II not separately deciduous.

Spikelets not thickened at the base . 1. PASPALUM.

Spikelets thickened at the base . . 2. ERIOCHLOA.

Glumes 4, I and II separately deciduous . 3. ISACHNE.

Glumes 4, I and II not separately deciduous.

Branchlets of panicle not produced beyond the spikelets (rarely in *Panicum plicatum*).

Spikelets not involucelled by scabrid bristles.

Glume IV sessile or subsessile . 4. PANICUM.

Glume IV with a flattened stipes . 5. ICHNANTHUS.

Spikelets involucelled by scabrid bristles . . . . . . 6. SETARIA.

Branchlets of panicle produced beyond the terminal spikelets . . . 7. CHAMÆRAPHIS.

§§ Spikelets awned (see exceptions under §).

Palea of glume III very short, bifid . 8. AXONOPUS.

Palea of glume III 0, or entire . . 9. OPLISMENUS.

†† Spikelets persistent on their pedicels or deciduous with them.

Spikelets in fascicles involucelled by bristles . . . . . . . 10. PENNISETUM.

Spikelets solitary on a flattened rhachis.

Spikelets biseriate . . . . . 11. STENOTAPHRUM.

Spikelets uniseriate . . . . 12. THUAREA.

** Diœcious shrub . . . . . . . 13. SPINIFEX.

Tribe II. **Arundinelleæ.***—Spikelets panicled, articulate on their pedicels, disarticulating or persistent, bisexual, 1–2-fld.; glumes 4, I and II often separately deciduous, I shortest, IV membranous, 1–3-awned, or awnless, not hardening in fr.; stam. 3; hilum punctiform . . . . . . . . 14. ARUNDINELLA.

Tribe III. **Oryzeæ.**†—Spikelets panicled, bisexual, 1-fld.; glumes 1–3, palea 1–3-veined; fruiting glume chartaceous or membranous; stamens 6; hilum linear.

Glumes 1–3, chartaceous, I and II often rudimentary . . . . . . . . 15. ORYZA.

Glume solitary, membranous, awnless . . . 16. LEERSIA.

Glume solitary, awned . . . . . . . 17. HYGRORYZA.

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* I have adopted Dr. Stapf's name (in Flor. Capens.) for this Tribe, that of *Tristegineæ* being inapplicable, from the genus *Tristegia* having been preceded by *Melinis*, Nees. Further, *Arundinella* is the dominant genus of the Tribe.

† I follow Bentham, Hackel, and Fl. B. Ind. in retaining this Tribe in *Panicaceæ*. Dr. Stapf has (Fl. Capens.) removed it to *Poaceæ* and placed it near *Phalarideæ*, probably rightly. See remarks under *Oryza* in this work.

Tribe IV. **Zoysieæ.***—Spikelets deciduous with their (articulate) pedicels (except *Zoysia*), 1-fld., bisexual (unisexual in *Trachys*); glumes 2–4; flg. glume not hardening in fr.; stam. 2 or 3; hilum punctiform.

Spikelets spicate.
  Spikelets fascicled.
    Fascicles secund on a broad articulate rhachis 18. TRACHYS.
    Fascicles all round a slender rhachis . . 19. TRAGUS.
  Spikelets in racemed spikes, glumes 2 . . 20. ZOYSIA.
Spikelets racemose.
  Glumes not awned, I and II with pectinate crests . . . . . . . . 21. LOPHOLEPIS.
  Glumes I and II long-awned, not crested . 22. PEROTIS.

Tribe V. **Phareæ.**† — Spikelets panicled, 1–fld., unisexual, male and fem. very dissimilar; glumes 3, III of fem. spikelets hardened or inflated in fr.; stam. 3 or 6; l. usually long petioled, net-veined by strong cross venules; hilum linear . . . 23. LEPTASPIS.

B. Rhachis of infl., usually articulate and more or less fragile, but sometimes tenacious. See also *Stenotaphrum* and *Trachys*.

Tribe VI. **Maydeæ.**‡—Infl. monœcious, spicate, male and fem. spikelets on the same spike, when the fem. are at the base of the spike, or on different spikes; spikelets large, never awned, male and fem. very dissimilar, glumes III and IV membranous or hyaline, hilum punctiform, embryo large.

Fruiting spikelet enclosed in a stony, polished, nut-like bract . . . . . . . 24. COIX.
Fruiting spikelet with glume I, forming a crustaceous, polished, nut-like envelope to the other glumes and grain . . . . . 25. POLYTOCA.

Tribe VII. **Andropogoneæ.**—Infl. spicate racemed or panicled; spikelets usually small, solitary, or binate, a sessile and a pedicelled, 1–2-fld., sessile usually with a perfect fl., pedicelled male or neuter, rarely bisexual, sometimes ternate, a sessile with a perfect fl. and 2 lateral pedicelled male or neuter; glumes I and II awned or not, III and IV (sometimes II also) membranous or hyaline, IV always smallest, awned or reduced to an awn with a twisted base; hilum punctiform.

* Spikelets very many, all alike.

Subtribe 1. DIMERIEÆ.—Spikelets solitary, secund on a filiform or flattened rhachis . . . . . . . 26. DIMERIA.

Subtribe 2. SACCHAREÆ.—Spikelets all alike, solitary or binate in open or contracted panicles, or in spikes or racemes.

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* Tribe *Zoysieæ* is a very heteromorphous group, removed by Dr. Stapf (Fl. Capens.) to *Poaceæ*, and placed near Tribe *Stipeæ*.

† Tribe *Phareæ* is established by Dr. Stapf. (Fl. Capens.) and removed from *Panicaceæ* to the neighbourhood of *Bambuseæ*. Its affinities are very obscure. By Bentham, and Hackel, and in Fl. B. Ind., *Leptaspis* is placed in *Oryzeæ*.

‡ Name derived from the Maize, *Zea Mays*, L., which belongs to this Tribe, though an anomalous member of it.

Spikelets awnless, 1-fld.
Rhachis of raceme inarticulate . . . 27. IMPERATA.
Rhachis of raceme articulate, fragile . . 28. SACCHARUM.
Spikelets awned, 2-fld. . . . . . . 29. POLLINIA.
** Spikelets few or many, in more or less dimorphous heterogeneous pairs, rarely solitary, by suppression of the pedicelled spikelets.
§ *Spikelets sunk in pits of an articulate fragile rhachis.*

Subtribe 3. ROTTBOELLIEÆ.
Sessile spikelets solitary in each internode of the spike.
Glume I. ovate or oblong, smooth . . 30. ROTTBOELLIA.
Glume I. globose, inflated, pitted . . 31. MANISURIS.
Sessile spikelets 2, opposite in each internode 32. MNESITHEA.
§§ *Spikelets not sunk in pits of the rhachis.*

Subtribe 4. ISCHÆMEÆ.—Spikelets many, binate, rarely solitary, secund in solitary digitate or fascicled spikes or racemes. Glume III of sessile spikelet male, rarely neuter. See also *Pollinia.*
Margins of glume I of sessile spikelets inflexed.
Glumes unarmed . . . . . . . 33. ISCHÆMUM.
Margin of glume I pectinately aculeate . 34. EREMOCHLOA.
Margins of glume I of sessile spikelet not inflexed.
Spikelets 2-awned . . . . . . 35. POGONATHERUM.
Spikelets 1-awned.
L. lanceolate, spikelets 2-fld. . . . 36. APOCOPIS.
L. cordate, spikelets 1-fld. . . . 37. ARTHRAXON

Subtribe 5. APLUDEÆ.—Spikelets 3, on a very short uninodal rhachis, a sessile 2-fld., and 2-pedicelled, enclosed in a peduncled spathe . . . . . . . . 38. APLUDA.

Subtribe 6. EUANDROPOGONEÆ.—Spikelets few or many, binate (rarely ternate), a sessile and pedicelled, spicate racemed or panicled, glumes 4, I not or obscurely keeled, III of sessile spikelets 0 or neuter, IV awned or reduced to an awn.
Spikelets in alternating pairs or lower solitary.
Infl. usually elongate, sessile spikelets many 39. ANDROPOGON.
Infl. very short, sessile spikelets 2 . . 40. PSEUDANTHISTIRIA.
Spikelets dimorphic, 4 lower sessile, forming an involucre around the upper.
Rhachis articulate above the involucrant spikelets . . . . . . 41. ANTHISTIRIA.
Rhachis articulate below the involucrant spikelets . . . . . . 42. ISEILEMA.

Series II. **Poaceæ.**—Spikelets solitary, rarely binate, inarticulate on their pedicels and persistent on them when in fr., rarely articulate at the base and deciduous, 1–many-fld., if more than 1-fld. the upper fl. or fls. male or neuter, fruiting, the uppermost one or more often imperfect; rhachilla of spikelet often more or less produced between the bases of the glumes, and often beyond the uppermost as a mucro, or elongate and bearing reduced glumes—Herbs or (Tribe *Bambuseæ*) shrubs or trees.

*Exceptions.*—Spikelets articulate at the base and deciduous in *Garnotia*, *Sphærocaryum*, *Polypogon*, some *Sporoboli*, and *Lophatherum*. Lower flg. glumes neuter or male in *Phragmites* and *Pommereulla*.

A. Perennial, or annual herbs (never shrubby or arboreous).

I. Spikelets not inserted in notches or pits of a simple rhachis, except in *Oropetium*.

Tribe VIII. **Stipeæ.**—Spikelets panicled, 1-fld., rhachilla not produced beyond glume III, which is bisexual, awned, hardened in fr., and tightly envelops the grain.

Awn 3-fid. . . . . . . . . . 43. ARISTIDA.

Tribe IX. **Agrostideæ.**—Spikelets panicled, 1-fld., rhachilla sometimes produced beyond the upper glume; glumes 3, membranous, I and II 1–3-veined, usually longer than the flg.; stam. 2–3.

Spikelets terete, glumes all 3-veined . . . 44. GARNOTIA.
Spikelets ellipsoid, glumes II and III 1-veined . 45. SPHÆROCARYUM.
Spikelets laterally compressed.
  Glumes I and II awned . . . . . 46. POLYPOGON.
  Glumes I and II not awned, membranous.
    Pericarp of grain loose . . . . . 47. SPOROBOLUS.
    Pericarp of grain adherent to the seed, hairs of callus very long . . . . 48. CALAMAGROSTIS.

Tribe X. **Aveneæ.**—Spikelets panicled, 2- or more-fld.; glumes 4 or more, I and II usually hyaline or scarious, flg. with a usually twisted awn; stam. 2–3.

Subtribe 1. EUAVENEÆ.—Spikelets 2–many-fld., rhachilla produced beyond the uppermost flg. glume. . . 49. AVENA.

Subtribe 2. AIREÆ.—Spikelets panicled, 2-fld., glumes 4, membranous or chartaceous, rhachilla not produced beyond glume IV.

Spikelets awned . . . . . . . . 50. ERIACHNE.
Spikelets not awned.
  Rhachilla short . . . . . . . 51. ZENKERIA.
  Rhachilla elongate between glumes III and IV 52. CŒLACHNE.

Tribe XI. **Chlorideæ.**—Spikelets small or minute, sessile or subsessile, secund and 2-seriate in very slender solitary digitate racemed or panicled dense-fld. spikes, rarely 3–many-seriate or alt. and distant, 1- or more-fld., empty glumes 1-veined, flg. 3-veined—the infl. of *Gracilea* is abnormal. See *Lepturus* in Tribe *Hordeaceæ*.

Spikelets 1-fld., half sunk in the alt. cavities of a solitary simple spike . . . . 53. OROPETIUM.
Spikelets 2-seriate, crowded in a solitary terminal spike.
  Spikelets 1–2-fld. . . . . . . . 54. ENTEROPOGON.
  Spikelets 3–many-fld. . . . . . . 55. TRIPOGON.
Spikelets 2- rarely many-seriate, crowded in digitate racemed or panicled spikes (spike rarely solitary in *Chloris*).
  Spikelets 1–fld. (see also *Leptochloa*).
    Glumes 3, III not awned . . . . . 56. CYNODON.
    Glumes 4–8, III awned . . . . . 57. CHLORIS.
  Spikelets 2- or more-fld.
    Spikes digitate or whorled, not awned . 58. ELEUSINE.
    Spikes racemed, glumes I and II awned . 59. DINEBRA.

Spikelets 1- or sub 2-seriate, distant in long slender racemed or panicled spikes.
Spikelets 1-fld., glume III awned . . 60. DICHÆTARIA.
Spikelets 1–many-fld., not awned . . 61. LEPTOCHLOA.
Spikelets in turbinate subsessile secund fascicles which are articulate on the rhachis of a slender terminal spike . . . . . 62. GRACILEA.

Tribe XII. **Festuceæ.**—Infl. various, mostly panicled; spikelets usually pedicelled, 3- or more rarely 2-fld., rhachilla articulate at the base, produced between the flg. glumes, and often beyond them bearing empty glumes, awn, if present, not twisted, glumes I and II persistent (except in *Lophatherum*).

Subtribe 1. PAPPOPHOREÆ.—Spikelets spicate, flg. glumes many-awned or deeply lobed, many-veined.
Flg. glumes flabelliform, deeply 3–4-lobed . 63. POMMEREULLA.

Subtribe 2. ARUNDINEÆ.—Spikelets panicled, many-fld., glumes narrow, all 3-veined, flg. enveloped in very long hairs.
Glumes all hyaline, hairs from the callus . . 64. PHRAGMITES.

Subtribe 3. SESLERIEÆ.—Spikelets very minute, crowded in globose clusters, forming interrupted spiciform panicles, mixed with the empty glumes of imperfect spikelets . . 65. ELYTROPHORUS.

Subtribe 4. ERAGROSTEÆ.—Infl. various; spikelets many-fld., glumes I and II 1–5-veined, much shorter than the rest of the spikelet, flg. glumes 3-veined.
Flg. glumes entire.
Glumes I and II awned . . . . . . 66. MYRIOSTACHYA.
Glumes not awned.
Glume II 3-veined . . . . . . 67. ERAGROSTIS.
Glume II 5-veined . . . . . . 68. HALOPYRUM.
Flg. glumes 2-toothed . . . . . . 69. DIPLACHNE.

Subtribe 5. CENTOTHECEÆ.—Spikelets 1–more-fld., 1–2-seriate, secund, spicate, or on the spiciform branches of a large open panicle; empty glumes 3–7-veined, flg. 3–9-veined; leaves tessellately veined.
Spikelets awned.
Spikelets 1–1½ in., stigmas very long, contorted 70. STREPTOGYNE.
Spikelets ⅓–½ in., stigmas free . . . 71. LOPHATHERUM.
Spikelets ⅛–¼ in., not awned . . . . 72. CENTOTHECA.

Subtribe 6. EUFESTUCEÆ.—Spikelets spicate or panicled, glume I 1–3-veined, II 5–7-veined.
Spikelets shortly spicate, spikes capitate, flg. glumes 7–9-veined . . . . . 73. ÆLEUROPUS.
Spikelets panicled . . . . . . . 74. POA.
Spikelets distant, on a long, slender rhachis . 75. BRACHYPODIUM.

II. Spikelets spicate, secund, inserted in notches or pits of a simple rhachis (see *Oropetium* in *Chlorideæ*).

Tribe XIII. **Hordeaceæ.**
Spike cylindric, articulate . . . . . . 76. LEPTURUS.

B. Perennially leafy shrubs or trees.

Tribe XIV. **Bambuseæ.**—Spikelets few- or many-fld., all alike in form, bisexual, inarticulate at the base, pedicels often bearing empty

glumes (bracts) below the spikelet; glumes subherbaceous or chartaceous; lodicules usually 3; stam. 3–6- or many; leaves more or less petioled, articulate on the sheath.

Palea 2-keeled, stam. 3 . . . . . . 77. ARUNDINARIA.
  Palea 2-keeled, stam. 6.
    Pericarp of seed thin, adnate to the seed.
      Filaments free . . . . . . 78. BAMBUSA.
      Filaments connate . . . . . 79. OXYTANTHERA.
    Pericarp fleshy or crustaceous, seed free . 80. TEINOSTACHYUM.
  Palea membranous, stam. very many . . 81. OCHLANDRA.

## 1. **PASPALUM**, *L.*

Annual or perennial grasses; spikelets 1-fld., awnless, in digitate racemose or panicled spikes, or on spike-like branches of a raceme or panicle, jointed on the pedicel but not thickened at the base; glumes 3 (homologous with II, III, and IV of *Panicum*), I and II membranous, as long as III, or I shorter or 0, II epaleate, III flg., paleate, coriaceous, smooth, shining, palea coriaceous, margins inflexed; stam. 3; styles 2, free, stigmas plumose, exserted from near the top of the spikelet; grain oblong, compressed, free but tightly enclosed within the hardened glume and palea.—Sp. about 100; 15 in *Fl. B. Ind.*

In many Indian species of *Paspalum* (including *P. sanguinale*) the gl. I of *Panicum* is present in a minute scale at the base of gl. II, but I have not found this in any Sinhalese specimen.

Rhachis of spike flattened.
  Spikelets orbicular or very broadly oblong.
    Spikelets glabrous or nearly so . . . 1. P. SCROBICULATUM.
    Spikelets ciliate with long hairs . . . 2. P. CONJUGATUM.
  Spikelets ovoid oblong or lanceolate.
    Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. . . . . . . 3. P. SANGUINALE.
    Spikelets $\frac{1}{24}$–$\frac{1}{16}$ in.
      Spikelets subsilky with slender hairs . 4. P. LONGIFLORUM.
      Spikelets tomentose with clavellate hairs 5. P. ROYLEANUM.
Rhachis of spike or branches of panicle filiform. . . . . . . . 6. P. PERROTTETII.

1. **P. scrobiculatum,** *Linn. Mant.* i. 29 (1767). **Amu,** *S.* **Waragu,** *T.*

Thw. Enum. 357. Moon, Cat. 7.

Fl. B. Ind. vii. 10. Host, Gram. Austriac. t. 74 (*P. Kora*). Rheede, Hort. Mal. xii. t. 84.

Perennial; stems 2–3 ft., tufted, erect, rather stout, leafy from the base upwards; l. bifarious, erect or suberect, 6–18 by $\frac{1}{12}$–$\frac{1}{3}$ in., flat, finely acuminate, mid vein slender, margins scaberulous; sheath 4–8 in., compressed, loose, mouth hairy, ligule very short, membranous; spikes 2–6, sessile, usually distant and spreading, 1–6 in. long, rhachis filiform, or broad

(up to $\frac{1}{6}$ in.) and concave, herbaceous, margins ciliolate; spikelets $\frac{1}{16}$–$\frac{1}{8}$ in. diam., closely imbricate in 2–3-series, sessile or shortly pedicelled, from nearly orbicular to subovoid, obtuse or subacute, biconvex, glabrous, very rarely sparsely hairy, drying brown; glumes 3, I and II equal and similar, plano-convex, membranous, closely investing III, which is thickly coriaceous, with thickened rounded incurved margins all round, minutely striolate, shining, palea orbicular, tumid, thickly coriaceous like gl. III, dorsally convex, ventrally strongly inflexed below the middle and forming 2 broad membranous auricles that embrace the grain; stigmas short, purple; grain biconvex, embryo large.

Thwaites, following Kunth, gives 3 varieties as occurring in Ceylon. The characters of these as represented by specimens named by him in the Perdeniya Herbarium are as follows:—

Var. *α.* Kunth, Enum. Pl. i. 53. Spikes 2–6 in. long, rhachis broad; spikelets biseriate, subsessile, $\frac{1}{10}$–$\frac{1}{8}$ in. diam.; glumes I and II 5–8-veined, II often pitted towards the margins. *P. frumentaceum*, Rottb. ex Rœm. and Sch. Syst. ii. 296. *P. Kora*, Willd. Sp. Pl. i. 332. C. P. 863.

Var. *β.* Kunth, l. c. Spikes 1–2$\frac{1}{2}$ in., rhachis narrow; spikelets biseriate, $\frac{1}{16}$–$\frac{1}{12}$ in. diam. C. P. 865.

Var. *γ.* Kunth, l. c. Spikes 1–2 in., spikelets 2–3-seriate on short curved puberulous pedicels; glumes I and II glabrous or puberulous, 3-veined. C. P. 2434.

Hotter parts of the island, very abundant, indigenous up to Nuwara Eliya. Var. *α* cultivated.

All warm countries.

Ferguson (Gramin. 3) observes that there are five varieties of this plant cultivated in Ceylon, with different Siṇhalese names. One variety, called Mat amu (amu = inebriating) gives a poisonous quality to the water in which the grain is boiled. Ainslie (in his Mat. Med. Hindost.) says of a variety called Serraku Warugu, T., that if not dressed in a peculiar manner it is said to produce vertigo and nausea In Dalzell and Gibson's Flora of Bombay, it is stated that in the hill-lands of the Concan large numbers of natives may be seen affected with temporary insanity and spasms from eating the seeds of a variety there called Hurruk.

2. **P. conjugatum,** *Berg. in Act. Helvet.* vii. 129 (1772).
Trim. Cat. Ceyl. Pl. 104. *Digitaria distachya*, Moon, Cat. 8. C. P. 3923.
Fl. B. Ind. vii. 11. Berg. l. c. t. 8. *Trin. Sp. Gram. Ic.* t. 102.

Annual or perennial, creeping below and stoloniferous; stolons elongate, stout, rooting at the nodes and sending up stout or slender, leafy, simple or branched, glabrous stems 1–2 ft. high; l. 2–6 by $\frac{1}{4}$–$\frac{1}{3}$ in., linear-lanceolate, acute or acuminate, flat, membranous, margins ciliate, cilia long towards the narrowed or rounded base, midrib slender, sheath shorter than the blade, loose, compressed, mouth and upper margins ciliate, and with a pubescent ridge dorsally at the junction with the blade, ligule 0; ped. very slender; spikes 2, terminal, 3–4 in., very shortly pedicelled, pedicel pubescent,

slender, striate, divaricate, rhachis narrow, strongly keeled ventrally down the middle, glabrous; spikelets $\frac{1}{16}$ in., orbicular-oval, apiculate, strongly compressed, biseriately imbricate, very shortly pedicelled, pale green or white; glumes I and II equal and similar, hyaline, mid vein 0, I with marginal long-ciliate veins, II veinless, III thinly coriaceous, slightly convex, margins narrowly incurved, palea as large as III; fil. very short, anth. short, oblong; styles short, stigmas pale.

Moist places, introduced from the W. Indies to trop. and subtrop. regions of the old world.

The sour grass of Barbados, spreads rapidly, frequently taking the place of other grasses and killing them (Ferguson).

3. **P. sanguinale,** *Lamk. Illustr.* i. 176 (1771). **Gurwal,** *S.*
*Panicum sanguinale*, Linn.; Thw. Enum. 358. *Digitaria sanguinalis*, Scop.
Fl. B. Ind. vii. 13. Host, Gram. Austriac. ii. t. 17 and Lamk. Encycl. t. 849 (*Panicum*).

Perennial; stems 6–18 in., tufted, erect or decumbent or creeping and branched below, leafy; l. 3–10 in., linear or linear-lanceolate, acuminate, flat, usually flaccid, glabrous or sparsely hairy, especially towards the base, and on the rather long sheath, ligule short, broad, truncate, rather coriaceous; infl. long-peduncled, spikes 3 or more, sessile or stipitate, 1–6 in., subdigitate, alternate, or if panicled whorled or fascicled, rhachis slender, flattened, trigonous, striate or subflexuous, scaberulous; spikelets secund, $\frac{1}{12}$–$\frac{1}{8}$ in., solitary or binate, subsessile or pedicelled, if binate pedicels unequal, lanceolate or oblong-lanceolate, acute or acuminate, pale; glumes 3, I and II ciliate or hairy, empty, I at the back of the fl. gl. as long as II or shorter or very short, 5-veined, II as long as the flg. gl., lanceolate, acuminate, 5–7-veined, marginal veins villously ciliate, flg. gl. plano-convex, lanceolate, acuminate, coriaceous, veinless, margins strongly incurved, palea ovate-lanceolate, acuminate, coriaceous; fil. short; stigmas short.

One of the most common and variable of grasses, the forms of which are so connected by intermediates that I find it impossible to limit or group them satisfactorily. The following varieties are contained in the Peradeniya Herbarium, and may be supposed to include the prevalent Siṅhalese ones; but others common in India may be presumed to occur. None of these Siṅhalese specimens have the minute glume at the base of gl. II which is found in many Indian ones.

Gl. II with one dorsal median vein, and 2–3 submarginal.
Gl. I very short; spikes few, 4–6 in., subcorymbose; spikelets $\frac{1}{8}$ in., gl. II shortly villously ciliate. C. P. 861.
Gl. I half as long to nearly as long as II, stem tall, stout; l. 4–5 by $\frac{1}{4}$–$\frac{1}{3}$ in.; hairy; spikelets corymbose or panicled, the lower in

the panicle whorled, and sometimes with distichous short branchlets; spikelets $\frac{1}{8}$ in.; gl. I and II villously ciliate with erect hairs. *Panicum corymbosum*, Roxb.; Thw. Enum. 436. C. P. 3800.

Tall, slender, l. very narrow, glabrous, spikes few, 4–5 in., spikelets $\frac{1}{8}$ in. distant, gl. I and II villously ciliate with very long spreading hairs. C. P. 862 in part.

Very slender, decumbent, creeping below, l. 1–2 in., glabrous, spikes 3, subdigitate, spikelets $\frac{1}{12}$ in., shortly pedicelled, gl. I and II villously ciliate with suberect hairs. C. P. 856.

Gl. II with 3–5 dorsal veins and 2 or 3 submarginal.

Gl. I and II equal or nearly so; stem rather stout; l. 4–6 by $\frac{1}{8}$ in., rigid, striate, erect, glabrous; spikes 3–4, 3–4 in., digitate, sessile; spikelets $\frac{1}{12}$ in., shortly pedicelled, ovate, acuminate, shortly ciliate. *Panicum ciliare*, Retz.; Thw. l. c. 358. C. P. 3976.

Gl. I shorter than II; stem very slender, decumbent, creeping and branched below; l. 2–3 in., flaccid, glabrous, spreading, spikes 3–5, digitate, 3–6 in.; spikelets $\frac{1}{8}$ in., shortly pedicelled, oblong, acute, gl. I and II villous with long spreading hairs. C. P. 862 in part.

Abundant throughout the island up to 4000 ft. elevation.

All warm countries.

A pasture grass of which cattle are fond (Ferguson).

4. **P. longiflorum,** *Retz. Obs.* iv. 15 (1786).

*P. filiculme*, Nees MSS., ex Thw. Enum. 358. *Digitaria longiflora*, Pers.; Moon, Cat. 8. C. P. 860.

Fl. B. Ind. 17.

Perennial; stems creeping and rooting, sometimes many inches long and much branched, naked or leafy, sending up very slender ascending glabrous branches 3–12 in. high and leafy chiefly below the middle; l. $\frac{1}{2}$–4 in. long, up to $\frac{1}{4}$ in. broad, linear-lanceolate, acuminate, flat, membranous or in short leaved states stiff and pungent, glabrous or sparsely hairy on the back and sheaths; ped. very slender; spikes 2–5, terminal, sessile or subsessile, 1–3 in. long, erect or recurved, very slender, rhachis narrowly winged, rather broader than the spikelets, glabrous; spikelets minute, $\frac{1}{18}$-$\frac{1}{16}$ in., solitary or binate, very shortly pedicelled, oval, subacute, rather turgid, pale, glabrous or subsilky with straight hairs; gl. I 3–7-veined, II as long but rather narrower, 3–5-veined, III ovate-lanceolate, acuminate, thinly coriaceous, pale brown, smooth, not veined, palea with inflexed (not auricled) flaps.

Common in the low country and inland.

Tropical and subtropical region of the old world.

Some specimens collected by Dr. Trimen in the Nitre Cave district, Sept. 1888, are nearly 18 in. high, tufted, erect, with no appearance of creeping stem; the rhachis of the spike is very slender, and the spikelets sometimes pedicelled.

This species forms a large portion of the swards about Colombo, creeping close to the ground and helping to bind the soil. When in flower the spikes give a beautiful slate or blueish colour to the spots in which it grows (Ferguson).

5. **P. Royleanum,** *Nees ex Thw. Enum.* 358 (1864).
Trim. Cat. Ceyl. Pl. 158. *Panicum puberulum*, Kunth, Revis. Gram. i. 32. C. P. 859.
Fl. B. Ind. vii. 18.

Perennial; stems 12–18 in., tufted, slender, erect, leafy; l. 3–6 by $\frac{1}{10}$–$\frac{1}{6}$ in., erect, narrowly linear, finely acuminate, flat, glabrous or sparsely ciliate with long flexuous hairs towards the base and on the sheath, ligule short, rounded, membranous; ped. slender, sometimes leafy to near the top; spikes 3–9, alternate towards the summit of the ped., 3–5 in. long, erect, very slender, rhachis filiform, very narrowly winged, hardly broader than the spikelets, glabrous; spikelets $\frac{1}{20}$–$\frac{1}{18}$ in. long, secund, pedicelled, turgidly oval, rounded at both ends, pedicels sometimes as long as the spikelets, glabrous or setulose; gl. I 0 or a minute tuft of hairs, II as long as III and broader, very convex, many-veined, tomentose with short, white, clavellate hairs, III oval-ovate, acute, dark brown, thinly coriaceous, smooth, polished, striolate; palea with broadly inflected flaps.

Borders of paddy fields, &c.
Hilly districts of India and Tropical Africa.
Glume I is often present in Indian specimens, and sometimes nearly as long as III.

6. **P. Perrottetii,** *Hook. f. Fl. B. Ind.* vii. 20 (1896).
*Panicum Wallichianum*, Wight and Arn.; Thw. Enum. 358. C. P. 3249.
Fl. B. Ind. l. c. Kunth, Revis. Gram. ii. t. 3 (*Panicum*).

Perennial; stem 6–24 in., shortly creeping and branching below, very slender, leafy; l. 1–6 by $\frac{1}{6}$–$\frac{1}{4}$ in., linear-lanceolate, acuminate, flat, glabrous or subsilkily hairy, margins often crimped, sheath loose, ciliate, ligule long, membranous; ped. very long, slender; spikes filiform, in an erect pyramidal panicle 3–6 in. high, lower 1–2 in. long, whorled, angular, glabrous or ciliate with scattered long hairs; spikelets $\frac{1}{20}$–$\frac{1}{12}$ in., scattered, subsecund, pedicelled, solitary or in pairs, ovoid-oblong or lanceolate, pedicel of the upper longer than the spikelet; glumes I and II shortly pubescent, green or red-brown, I shorter than III, obtuse, 5–7-veined, II acuminate, 7–9-veined, III ovate-lanceolate, acuminate, smooth; stigmas nearly as long as the glume; grain narrowly ovoid, acute, embryo rather small.

Central Province; Maturata and the Horton Plains (Thwaites).
Also in the Nilgiri Hills and N. Africa.

### 2. **ERIOCHLOA,** *H. B. and K.*

Characters of a *Paspalum* with filiform panicled spikes, but base of spikelets thickened, articulate on the thickened

top of the pedicel; glume III aristulate.—Sp. few; 1 in *Fl. B. Ind.*

**E. polystachya,** *H. B. and K. Nov. Gen. and Sp. Pl.* i. 95 (1815). *Milium ramosum*, Roxb.; Moon, Cat. 8. E. annulata, *Kth. Thw. Enum.* 358. C. P. 3323.

Fl. B. Ind. vii. 20. H. B. and K., l. c., t. 31. Trin. Sp. Gram. Ic. t. 155 (*Paspalum punctatum*, Fluegge).

Perennial, densely tufted, 2–5 ft. high, rootstock short, creeping; stem leafy, stout or slender, simple or branched, quite glabrous except the puberulous nodes; l. 3–6 in., linear or linear-lanceolate, acuminate, flat, quite glabrous, as is the sheath, ligule a villous ridge; ped. long or short; panicle 2–5 in., erect or inclined, rhachis slender, angled, quite smooth; spikes (branches of panicle) alternate, 1–2 in., suberect, angular, quite smooth or scaberulous, rarely branched, lower naked for $\frac{1}{2}$–1 in.; spikelets $\frac{1}{12}$–$\frac{1}{8}$ in., loosely imbricate, shortly pedicelled, distichous, solitary or binate, oval-lanceolate, acuminate; glumes I and II subequal, membranous, oval-lanceolate, acute, silky, shining, veins 3, obscure, III shorter than II, oblong, dorsally compressed, obtuse, aristulate, thinly coriaceous, pale, shining, palea oblong, margins incurved; anth. linear; grain oblong, free within the hardened smooth glume and palea.

Hotter parts of the Island; common. Spikelets silvery.
Also in tropical countries generally.

### 3. ISACHNE, *Br.*

Perennial grasses; spikelets loosely panicled, not or obscurely jointed on the pedicel, subglobose or obovoid, 1–2-fld.; glumes 4, 2 lower often separately deciduous, thinly coriaceous or membranous, strongly veined, I and II subequal, convex, empty, III and IV paleate, equal and both convex, or III larger and flatter, III male or neuter, IV jointed and often stipitate on the very short rhachilla, hemispheric, fem. or bisexual; stam. 3; styles 2, free, stigmas short, feathery, exserted at the top of the spikelet; grain free within the hardened glume and palea; seed broad, plano-convex, embryo small.—Sp. about 25; 16 in *Fl. B. Ind.*

Spikelets $\frac{1}{20}$–$\frac{1}{10}$ in. long.
  Gl. I and II longer than III and IV, cuspidate or acuminate.
    Stem 6–10 in. . . . . . . . . . 1. I. KUNTHIANA.
    Stem 2–4 ft. . . . . . . . . . 2. I. ELATIOR.
  Gl. I and II much shorter than III and IV . . 3. I. MULTIFLORA.
  Gl. I and II about equalling IV

Panicle ovoid or pyramidal . . . . . 4. I. AUSTRALIS.
Panicle small, lax-fld. . . . . . . 5. I. MILIACEA.
Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. long.
Gl. I and II subequal, 7–9-veined . . . . 6. I. WALKERI.
Gl. I much shorter than II, 3–5 veined . . 7. I. GARDNERI.

1. **I. Kunthiana,** *Wight and Arn. in Wight, Cat. n.* 1659 (1834).
Steud. Syn. Gram. 96. Thw. Enum. 362. C. P. 314, 881.
Fl. B. Ind. vii. 21.

Stem 6–10 in., rigid, leafy, geniculately branched below, glabrous or pubescent; l. $\frac{1}{2}$–2$\frac{1}{2}$ in., ovate or ovate-lanceolate, acuminate, base amplexicaul, flat, rigid, closely striate, midrib obscure, glabrous pubescent or villously tomentose, margin sometimes cartilaginous, sheath long or short, ligule obscure, hairy; panicle on a short or long strict ped., ovate or oblong, 1–4 in. long, rhachis and branches rigid, strict, angular, smooth scabrid or ciliate, at length spreading; spikelets sub-secund, globose, $\frac{1}{20}$–$\frac{1}{12}$ in. diam., very shortly stoutly pedicelled, erect; glumes I and II subequal, cuspidate, strongly 7–9-veined, longer than III and IV, more or less pubescent or setulose, III and IV subequal, or III the largest, hemispheric, coriaceous, more or less pubescent, III fem., IV bisexual, palea oblong, obtuse, coriaceous.

Montane zone. Swampy ground in the Central Province; Nuwara Eliya, Dambulla, &c.

Also in the Nilgiri Mts., Java, Borneo, Singapore.

2. **I. elatior,** *Hook. f. Fl. B. Ind.* vii. 22 (1896).
C. P. 881 (in part).
Fl. B. Ind. l. c.

Stem 2–3 ft., sparingly branched, rather stout, glabrous or sparingly ciliate, nodes pubescent; l. distant, 2–4 in., ovate- or oblong-lanceolate, acute or acuminate, thin, flat, many-veined, and closely striate, scabrid above or on both surfaces, margins ciliate, base rounded or amplexicaul, sheath 1$\frac{1}{2}$–2$\frac{1}{2}$ in., margins ciliate, ligule of hairs; panicle 3–4 in., spikelets as in *I. Kunthiana;* glumes III and IV pubescent, pale green.

Montane zone, Nuwara Eliya (Gardner).

Endemic.

Perhaps only a larger state of *I. Kunthiana*, as supposed by Thwaites, but the specimens of *elatior* are very distinct-looking, are much larger, with thinner l. and a larger many-fld., usually more contracted panicle with longer branches. The spikelets at length wholly disarticulate from the very short pedicel.

3. **I. multiflora,** *Trim. Syst. Cat. Ceyl. Pl.* 104 (1885).
*I. australis*, var. *multiflora*, Thw. Enum. 361. C. P. 3671.
Fl. B. Ind. vii. 22.

Stems tall, 2–3 ft., densely tufted, erect, rather stout, wiry, leafy, branched, nodes glabrous; l. 4–6 by $\frac{1}{4}$–$\frac{1}{3}$ in., finely acu-

minate, coriaceous, striate, smooth, glabrous, flat, 5–7-veined, margins hardly cartilaginous, base narrow, obtuse, sheath 1–2 in., margins glabrous or ciliate, ligule of a few hairs; panicle 3–6 in., ovate-oblong, quite glabrous, rhachis and branches angular, branches alternate, lower up to 3 in. long, naked below, branchlets short; spikelets $\frac{1}{20}$–$\frac{1}{18}$ in., pedicel long or short, erect, purplish or green; glumes I and II orbicular, thin, veins obscure, III much longer than I and II, orbicular, subacute, thin, male, veins 0, palea oblong, obtuse, stam. very large, IV stipitate, hemispheric, coriaceous, obscurely hispid or smooth, very dark, coriaceous, palea coriaceous; grain small, orbicular, compressed.

Uva district (Thwaites), Abbotsford, Dambulla (Ferguson). Spikelets pale.

Endemic.

4. **I. australis,** *R. Br. Prod.* 196 (1810).
Thw. Enum. 361 (excl. some syn. and var.). C. P. 880.
Fl. B. Ind. vii. 24. Buchan., Grasses N. Zeald. t. 12.

Stem slender, erect or ascending from a creeping rootstock, 8–18 in. high, leafy, smooth, branched below, nodes glabrous; l. 1–2 in., linear-lanceolate, acuminate, many-veined and striate, flat, scaberulous on both surfaces, base rounded, margins not or very narrowly cartilaginous, glabrous or ciliate towards the base with long hairs, sheath $\frac{1}{2}$–1$\frac{1}{2}$ in., margins above the middle densely ciliate with long hairs, ligule a ridge of long, slender, erect, white hairs; panicle 1–1$\frac{1}{2}$ in. long, ovoid, branches alternate, flexuous, erect or spreading, usually divided, rhachis and branches angular, smooth; spikelets $\frac{1}{15}$–$\frac{1}{12}$ in., globose, sessile or pedicelled, green or violet, pedicels sometimes $\frac{1}{3}$ in., capillary; glumes I and II hemispheric, 7-veined, glabrous or with a few dorsal bristles, III rather longer, oblong, obtuse, veinless, male, IV hemispheric, coriaceous, villous, palea glabrous.

Var. **effusa,** Trim. Syst. Cat. Ceyl. Pl. 104. Fl. B. Ind. l. c. 25.

Stem 1–2 ft., l. 2–3$\frac{1}{2}$ in., lanceolate or linear-lanceolate, base narrower, panicle 3–5 in., more effuse, pedicels longer.

Abundant in damp and swampy places, often immersed in water. Var. *effusa*, in drier places, Peradeniya Garden, &c.—Spikelets green or coloured.

India, Australia, N. Zealand.

Collected in Ceylon by Hermann in 1660–1667. The Ceylon specimens vary much in the foliage but are remarkably constant as to the spikelets.

5. **I. miliacea,** *Roth. Nov. Pl. Sp.* 58 (1821).
*I. meneritana*, Poir. Encycl. Suppl. iii. 185 (excl. syn.). Trim. in

Journ. Bot. xxiii. (1885), 271; in Journ. Linn. Soc. xxiv. (1888), 136. *I. minutula*, Kunth; Trim. in Journ. Bot. xxvi. 168 (1889).
Fl. B. Ind. vii. 25. Kunth, Revis. Gram. ii. t. 117 (*I. minutula*).

Stem very slender, flaccid, prostrate, straggling, 6–18 in. long, creeping below, with slender, often filiform, ascending, glabrous branches, 3–6 in. high; l. $\frac{1}{2}$–$\frac{3}{4}$ in., ovate or ovate-lanceolate, acute or obtuse, membranous, striate and pilose on both surfaces with long hairs, base rounded, sheath slender, $\frac{1}{4}$–$\frac{1}{2}$ in., glabrous or ciliate, ligule a ridge of long hairs; panicle 1–1$\frac{1}{2}$ in. long and broad, laxly branched, rhachis and branches filiform, quite smooth; spikelets $\frac{1}{18}$–$\frac{1}{16}$ in. diam., few and distant, on long capillary pedicels, globose; glumes I and II orbicular-oblong, almost hemispheric, dorsally hispid with long spreading hairs, obscurely 7-veined, III rather longer, oblong, membranous, male, IV smaller, hemispheric, coriaceous, villously tomentose, female, palea glabrous.

Low ground in swampy places. Southern Province, Riseland, Udugama (Ferguson). Spikelets pale green.

India, Malaya, China, Pacific Islands, S. America.

The above description is from specimens in the Peradeniya Herbarium; others from India vary greatly, having stouter stems with hairy nodes, glabrous much larger l., and approach *I. australis* so closely as to suggest *I. miliacea* being a form of that species. Dr. Trimen indeed referred *I. meneritana* (which is certainly *I. miliacea*) to *australis*, but Mr. Rendle, who has examined the type specimen of that plant in the British Museum, agrees with me that it is referable to *miliacea*. The Meneritana of the Sinhalese is, as Dr. Trimen has pointed out (Journ. Bot. l. c.), not an *Isachne*, but *Panicum miliare*. *I. minutula*, Kunth, is a very small form from Udugama (Ferguson).

6. **I. Walkeri,** *Wight and Arn. ex Thw. Enum.* 361 (1864).
*I. nilagirica*, Hochst. Pl. exsicc. Hohenack. n. 1280. Trim. Cat. Ceyl. Pl. 104. *Panicum Walkeri*, *Steud. Syn. Gram.* 97. C. P. 282.
Fl. B. Ind. vii. 26.

Stem 2–3 ft., stout or slender, sometimes as thick as a crow-quill, strict, sparingly branched and leafy, decumbent at the base, or creeping with stout wiry root-fibres, internodes 2–3 in., nodes glabrous; l. 4–7 by $\frac{1}{3}$–1 in., linear-lanceolate, acuminate, strict, flat, smooth or nearly so on both surfaces, finely striate, margins narrowly cartilaginous, scabrid, base rounded, veins 3–5 and midrib very slender, sheath 2–3 in., margins above ciliate, ligule a ridge of long stiff hairs; panicle 8–12 in., few-fld., erect, rhachis strict, branches simple or sparingly divided, erect, capillary, quite smooth, the lower very long, subfascicled, two-thirds the length of the whole panicle; spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. long, few, distant, globosely obovoid, pedicels $\frac{1}{2}$–1$\frac{1}{2}$ in., erect, capillary, flexuous; glumes very obtuse, I and II subequal, cymbiform, herbaceous,

glabrous or setulose, 7–9-veined, III and IV equal and similar, cymbiform, coriaceous, glabrous, veinless, pale, paleate, III male, IV bisexual or fem., palea oblong, coriaceous; anth. nearly as long as the glumes.

Forests of the Central Province; very common. Spikelets dark green. Nilgiri Hills.

7. **I. Gardneri,** *Benth. in Gen. Pl.* iii. 1100 (1883).
*I. nilagirica*, Trim. Cat. Ceyl. Pl. 104 (*non Hochst.*). *Panicum Gardneri*, Thw. Enum. 359. C. P. 894.
Fl. B. Ind. vii. 26.

Stem slender, ascending from the much-branched shortly creeping base, 1–3 ft. high, closely ribbed, leafy, internodes 1–3 in., nodes glabrous; l. 2–4 by $\frac{1}{2}$–$1\frac{1}{4}$ in., ovate to ovate-lanceolate, acuminate, membranous, glabrous and smooth, or scaberulous and sparsely pilose on one or both surfaces, margin not thickened, scaberulous, base rounded or cordate, veins very faint, sheath glabrous or hairy, margins ciliate with long hairs, ligule of a few hairs; panicle 2–8 in. long, erect, very lax-fld., rhachis rather stout, smooth, angular, branches suberect or spreading, very unequal, lower fascicled, 3–6 in., some nearly as long as the panicle, rigid, wiry, sparingly divided; spikelets $\frac{1}{7}$–$\frac{1}{5}$ in., oblong, pedicels $\frac{1}{4}$–$\frac{3}{4}$ in., flexuous, tips thickened; glumes I, II, and III membranous, I inserted much below II, ovate-oblong, obtuse, 3-veined, and as well as II glabrous or dorsally setose, II longer than I, but broader and subacute, 5–7-veined, III as long as II, elliptic-oblong, subacute, glabrous, 5-veined, paleate, neuter, IV much shorter than III, bisexual, oblong, cymbiform, coriaceous, pale, smooth, glabrous, palea with sides almost convolute.

Forests in the Central Province, alt. 4000–6000 ft. Spikelets dark green.
Also in the Nilgiri and Anamallay Hills.

### 4. **PANICUM,** *Linn.*

Annual or perennial grasses of various habit; l. broad or narrow, ligule 0 or of hairs; infl. very various, spiciform, racemose or panicled; spikelets solitary or binate, small, often secund, ovoid or oblong, articulate at the base and deciduous, very rarely awned (*P. Crus-galli*), or glume IV with a short awn concealed by glume III (*P. ambiguum*, *setigerum*, *javanicum*); glumes 4, I and II empty, I smallest and fewest-veined, II and III usually subequal, oblong, ovate or lanceolate, III usually neuter, paleate or not, IV coriaceous or chartaceous, sometimes shortly stipitate, convex, 5–7-veined,

paleate, bisexual, palea usually as long as the glume, membranous; lodicules 2, cuneate; stam. 3; styles distinct, stigmas exserted near the top of the spikelet; grain free, but tightly embraced by the hardened glume and palea, oblong, ellipsoid, or lanceolate, hilum punctiform or orbicular, embryo rather large.—Sp. 200–250; 60 in *Fl. B. Ind.*

The following Key to the species of *Panicum* follows in the main the arrangement in the Fl. B. Ind. It can be regarded as a help only to the identification of the species. The characters distinguishing the sections *Brachiaria* and *Effusæ* are not very dependable.

A. Spikelets dorsally compressed or subterete.
  Infl. racemose, of simple (rarely branched) spikes bearing secund spikelets.
    Rhachis of spikes broad, flattened (*Paspaloideæ*).
      Spikelets biseriate.
        Spikelets villous . . . 1. P. ISACHNE.
        Spikelets glabrous.
          Spikes shorter than the internodes . . . . 2. P. FLAVIDUM.
          Spikes longer than the internodes.
            Glume IV granulate . . 3. P. PUNCTATUM.
            Glume IV smooth . . 4. P. FLUITANS.
      Spikelets 3–5-seriate, glume III cuspidate or awned (*Echinochloa*).
        Glume III awned . . . 5. P. CRUS-GALLI.
        Glume III cuspidate . . 6. P. COLONUM.
    Rhachis of spikes narrow, filiform, terete or angular (*Brachiaria*).
      Glume I as long or nearly as long as III
        Glume IV minutely granulate . 7. P. AMBIGUUM.
        Glume IV smooth, polished . 8. P. ORYZOIDES.
      Glume I much shorter than III.
        Spikelets approximate or imbricate.
          Glume I about $\frac{1}{4}$ as long as III, veinless or 1-veined.
            Spikelets glabrous or puberulous . . . . 9. P. PROSTRATUM.
            Spikelets pubescent or villous . . . . 10. P. VILLOSUM.
          Glume I $\frac{1}{4}$–$\frac{1}{2}$ as long as III, 5-veined.
            L. base narrow or rounded.
              Nodes densely bearded . 11. P. MUTICUM.
              Nodes naked or puberulous . . . 12. P. RAMOSUM.

L. base broad, cordate.
Gl. IV shortly awned.
Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. . . 13. P. SETIGERUM.
Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. . . 14. P. JAVANICUM.
Gl. IV muticous . . 15. P. DISTACHYUM.
Spikelets distant, mostly long-pedicelled. See also *P. ramosum.*
Gl. IV stoutly stipitate . . 16. P. SEMIVERTICILLATUM.
Gl. IV subsessile . . . 17. P. REMOTUM.
Infl. panicled, panicle spiciform or effuse. See also *P. ramosum.*
Glume II half as long as IV (*Breviglumæ*).
Panicle very narrow, branches very short . . . . 18. P. CANALICULATUM.
Panicle very broad, branches long . . . . . 19. P. NODOSUM.
Glume II as long as IV or longer.
Panicle narrow, spiciform, rarely effuse, glumes II and III very strongly veined, glume IV very thin.
Glumes II and III 3–5-veined (*Hymenachne*).
Infl. panicled . . . 20. P. AURITUM.
Infl. spiciform . . . 21. P. MYURUS.
Glumes II and III 7–9-veined (*Vilfoides*, Stapf.).
Infl. spiciform.
Glume I minute, spikelets lanceolate . . . 22. P. INTERRUPTUM.
Glume I $\frac{1}{2}$ as long as III, spikelets gibbous.
Panicle $\frac{1}{2}$–3 in. . . 23. P. INDICUM.
Panicle 4–6 in. . . 24. P. MYOSUROIDES.
Infl. an effuse panicle, spikelets gibbous . . . 25. P. CURVATUM.
Panicle broad, effuse (*Effusæ*). See also *P. curvatum.*
L. flat, not plicate.
Glume I nearly as long as III 26. P. OVALIFOLIUM.
Glume I shorter than III.
Annual.
Glume I not $\frac{1}{2}$ III.
Spikelets $\frac{1}{6}$–$\frac{1}{5}$ in. . 27. P. MILIACEUM.
Spikelets $\frac{1}{10}$–$\frac{1}{8}$ in.
Nodes of stem glabrous . . 28. P. MILIARE.
Nodes of stem bearded . . 29. P. CÆSIUM.
Glume I = $\frac{3}{4}$ III.
Glume III 7–9-veined 30. P. TRYPHERON.
Glume III 3–5-veined 31. P. HUMILE.
Perennial.
Glume IV rugulose . 32. P. MAXIMUM.

Glume IV. smooth.
Spikelets distant.
Glume I not $\frac{1}{4}$ III.
Ligule a coriaceous ridge . 33. P. REPENS.
Ligule of fine erect hairs . . 34. P. PROLIFERUM.
Glume I = $\frac{3}{4}$ III . 35. P. MONTANUM.
Spikelets crowded . 36. P. ANTIDOTALE.
L. strongly plicate . . . 37. P. PLICATUM.
B. Spikelets laterally compressed (*Gibbosæ*).
Spikelets $\frac{1}{16}$–$\frac{1}{10}$ in.
Spikelets shortly pedicelled.
Spikelets hispidulous . . . 38. P. TRIGONUM.
Spikelets glabrous . . . 39. P. PILIPES.
Spikelets long-pedicelled.
L. glabrous or nearly so . . 40. P. PATENS.
L. softly pubescent . . . 41. P. SPARSICOMUM.
Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. . . . . . 42. P. UNCINATUM.

1. **P. *Isachne,** *Roth, Nov. Sp.* 54 (1821).
*P. cruciforme*, Sibth.; Thw. Enum. 359. C. P. 903.
Fl. B. Ind. vii. 28. Trin. Sp. Gram. Ic. t. 262 (*P. caucasicum*).

Stem 1–2 ft., very slender, ascending from a decumbent or creeping base, leafy, glabrous, nodes tomentose; l. 1–2 in., lanceolate or linear-lanceolate from a rounded base, faintly scaberulous above and on the margins, glabrous or sparsely hairy towards the base, veins very slender, sheaths about 1 in., upper 2–3 in., glabrous or hairy, margins above ciliate, ligule a villously hairy ridge; panicle 2–3 in., erect, rhachis very slender, smooth, glabrous or puberulous above; spikes 8–12, unilateral, $\frac{1}{2}$–1 in. long, longer than the internodes, sessile or shortly peduncled, erect or recurved, rhachis slender, angular, tomentose; spikelets $\frac{1}{15}$ in., secund, very shortly pedicelled, closely imbricate in 2 series, oval-oblong, very pale; glume I minute, triangular, membranous, glabrous, II and III membranous, subequal, hispidly pubescent, oblong, obtuse, II 5-veined, III narrower, 3-veined, paleate, neuter, palea hyaline, IV shorter, oblong, obtuse, dorsally flattened, coriaceous, glabrous, shining, bisexual, palea coriaceous.

Low country; not uncommon in cultivated ground. An introduced species (Ferguson). Spikes very pale green.
Bengal and westward to Italy and N. & S. Africa.

2. **P. flavidum,** *Retz. Obs.* iv. 15 (1786).
*P. brizoides*, Jacq.; Thw. Enum. 359. C. P. 902.
Fl. B. Ind. vii. 28. Trin. Sp. Gram. Ic. t. 158, 159, and t. 172 (*P. distans*). Jacq. Eclog. ii. t. 2.

Stems 1–3 ft., slender, ascending from a short decumbent base; lower internodes 1–3 in., upper longer, nodes glabrous;

l. subbifarious, 3–5 by $\frac{1}{6}$–$\frac{1}{4}$ in. narrowly linear, acuminate, thinly coriaceous, glabrous or with the margins obscurely scaberulous, base hardly contracted, veins faint, sheath smooth, glabrous, margins eciliate, ligule a ridge of long hairs; panicle 6–10 in., erect or inclined, rhachis very slender, angular, smooth or scaberulous; spikes many, shorter than the internodes, $\frac{1}{2}$–1 in. long, distant, secund, sessile, erect or falcately recurved, rhachis flattened, much narrower than the spikelets, glabrous, sometimes ending in a naked mucro; spikelets $\frac{1}{12}$–$\frac{1}{8}$ in., sessile, gibbously globose, biseriate, closely imbricate, glabrous; glume I half as long as III, transversely oblong, hyaline, faintly 3-veined, II and III with veins anastomising above, II much shorter than IV, orbicular, thin, 7-veined, III shorter than IV, orbicular, 5-veined, paleate, empty, IV broadly ovate or ovoid, tip acute, incurved, very convex, striolate-punctate, white, sides of palea infolded nearly to the middle, striolate.

Warmer parts of the island; very common. Spikelets green, nearly white, almost shining.

Tropical Asia and Africa.

A depauperate dwarf state occurs in the Mannar district.

3. **P. punctatum,** *Burm. Fl. Ind.* 26 (1768).

*P. mucronatum*, Roth, Nov. Sp. 45. *P. fluitans*, Roxb. Fl. Ind. i. 293 (non Retz.). C. P. 864, and 898 in Herb. Kew.

Fl. B. Ind. vii. 29. Duthie, Indig. Fodd. Grass. t. 44.

Perennial, quite glabrous; stem prostrate at the often floating base, 2–4 ft., rooting at the lower very stout spongy nodes; l. 4–8 in., linear, acute or acuminate, base narrow, veins many, slender, lower sheaths inflated, ligule a ridge of hairs; spikes many, $\frac{1}{2}$–1 in. long, distant, sessile, longer than the internodes, appressed to the rhachis, which is flattened, $\frac{1}{16}$ in. broad, margins smooth, tip excurrent, acicular, as long as the terminal spikelet; spikelets $\frac{1}{12}$–$\frac{1}{10}$ in., sessile, imbricate, biseriate, secund, ovate-oblong, glabrous; glumes membranous, I very short, truncate, II about half as long as IV, suborbicular, 3-veined, tip truncate or rounded, III ovate, acute, 3–5-veined, neuter, IV as long as III, ovate, cuspidately acuminate, thinly coriaceous, palea coriaceous, with inflexed membranous sides; grain orbicular, compressed, enclosed in the thickened white granulate glume.

Marshes in the hotter parts of the Island.

India, Malaya, N. Africa.

Closely resembles *P. fluitans*, and often confounded with it, but distinguished by the granulate fruiting glume. The numbers C. P. 864, 898, are from specimens in Herb. Kew. The only one of this plant in Herb. Peraden. was collected by Dr. Trimen near Kurunegala, Dec. 1883; it bears no number.

4. **P. fluitans,** *Retz. Obs.* v. 18 (1783), non Roxb.
Thw. Enum. 359 (in part). *P. paspaloides*, Pers. Syn. i. 81. C. P. 864, 897.
Fl. B. Ind. vii. 30 (*paspaloides*). Trin. Sp. Gram. Ic. t. 168 (*P. truncatum*).

Stem 1–4 ft., erect from a stout creeping base, often as thick as a swan's quill, smooth, soft, striate, lower internodes 2–5 in., clothed with large loose sheaths, upper 2–3 in., nodes quite glabrous; l. 4–8 in., narrowly linear, finely acuminate, softly coriaceous, glabrous, margins quite or nearly smooth, often incurved, base narrow, sheaths often longer than the internodes, glabrous, margins thin, eciliate, ligule a ridge with erect hairs; panicle 8–12 in. long, rhachis strict, erect, angular, glabrous or minutely scaberulous; spikes many, $\frac{1}{2}$–$1\frac{1}{2}$ in., unilateral, sessile, longer than the internodes of the rhachis and often appressed to it, rhachis glabrous or ciliolate; spikelets $\frac{1}{16}$–$\frac{1}{10}$ in., secund, biseriate, imbricate, ovoid, plano-convex; glume I about one-third the length of III, transversely oblong, veinless, white, II and III thinly herbaceous, II as long as IV or nearly so, orbicular-ovate, 7-veined, tip subacute or rounded, III ovate, subacute, 5-veined, paleate, empty or male, palea broad, IV sessile, broadly ovoid, mucronate, thinly coriaceous, dorsally compressed, smooth or nearly so, palea with inflexed membranous margins; grain orbicular, compressed.

Hotter parts of the Island, in wet places. Cattle are fond of it (Ferguson).
India, Afghanistan, Arabia, Africa, and America.
The name *P. fluitans*, Persoon, being (as Dr. Stapf pointed out to me) earlier by 22 years than *P. paspaloides*, Retz., should have been adopted for this plant in Fl. B. Ind. Its synonymy, as given in that Flora, is otherwise correct.

5. **P. Crus-galli,** *Linn. Sp. Pl.* 56 (1753). **Wel-marukku,** *S.*
Thw. Enum. 359, excl. var. *β*. *P. Crus-corvi* and *P. aristatum*, Moon, Cat. 8. C. P. 900, 3237.
Fl. B. Ind. vii. 30. Host, Gram. Austriac. ii. t. 19. Reichb. Ic. Fl. Germ. t. 29.

Annual; stem 1–3 ft., stout or slender, simple or branched, erect or base decumbent, leafy, internodes up to 6 in. long, nodes glabrous or hairy; l. 6–10 in., narrowly linear-lanceolate, up to $\frac{1}{2}$ in. broad, finely acuminate, smooth or scaberulous, flat, mid vein stout, sheaths 2–6 in., loose, glabrous, ligule a semi-lunar glabrous or hairy ridge; panicle 4–8 in., erect or drooping, rhachis stout, angled, glabrous, smooth or scaberulous, usually bearded at the insertion of the spikes; spikes $\frac{1}{2}$–3 in. long, gradually shorter upwards, longer than the internodes,

sessile, secund, suberect or spreading, rhachis stout, angular, much narrower than the spikelet, ciliate with scattered white bristles; spikelets secund, densely packed in 3–5 series, $\frac{1}{10}$–$\frac{1}{8}$ in. long (excl. the awn), sessile, turgidly ovoid, hispid with unequal, often tubercle-based bristles; glume I one-third to one-half of III, orbicular, abruptly acuminate, 5-veined, II and III subequal, orbicular-ovate, II acuminate or shortly awned, 3–7-veined, often interruptedly, III paleate, male or neuter, abruptly narrowed into a stout scabrid awn $\frac{1}{6}$–$\frac{1}{2}$ in. long, IV from orbicular to broadly oblong, obtuse or cuspidate, coriaceous, pale, shining; grain ovoid, acute, smooth.

Var. β, **frumentaceum,** Trim. Cat. Ceyl. Pl. 104. Fl. B. Ind. vii. 31. *Panicum frumentaceum*, Roxb., Fl. Ind. i. 304. Trin. Sp. Gram. Ic. t. 164.

Tall, robust, spikes thickened, often incurved, sometimes branched and corymbosely panicled, spikelets not awned, otherwise as in *P. Crus-galli.*

Var. γ, **stagninum,** Trim. in Herb. Perad. *P. stagninum.* Retz. Obs. v. 17. Moon, Cat. 8. Host, Gram. Austriac. iii. t. 51.

Panicle drooping, with long drooping spikes, crinite with the very long awns of the spikelets.

Hotter parts of the Island; very common. Var. β, cult. Abbotsford, Dambulla (Ferguson); var. γ, swamps. Spikes green or purplish.

All hot countries. Var. *frumentaceum* cult. only.

An examination of a large series of Indian specimens exhibits very great variation in *P. Crus-galli*, which passes imperceptibly into *P. colonum*, and renders it doubtful to which of the two var. *P. frumentaceum* is referable. There is in Herb. Peraden. a specimen of var. *frumentaceum* ticketed No. 192, Kolichúdan pulla, Mannar (Crawford), with glume III coriaceous and polished like glume IV.

Watt (Dict. of Econ. Prod. of India) describes the var. *frumentaceum* as the quickest growing of all millets, being harvested in some localities within six weeks of being sown. The grain is consumed chiefly by the poorer classes of India. The straw is an excellent cattle fodder.

6. **P. colonum,** *Linn. Syst. Ed.* x. 870.

Trim. Cat. Ceyl. Pl. 104. Moon, Cat. 8. *P. Crus-galli*, var. β, *minor*, Thw. Enum. 359. C. P. 901.

Fl. B. Ind. vii. 32. Trin. Sp. Gram. Ic. t. 160. Jacq. Eclog. t. 32.

Annual; stem 1–2 ft., slender, erect or decumbent and sometimes creeping below, internodes long, nodes glabrous or puberulous; l. 4–8 in., narrowly lanceolate or linear, acuminate, flat, glabrous, margins scaberulous, midrib slender, sheath up to 6 in. long, slender, glabrous, ligule 0 or an obscure ridge; panicle 3–5 in., inclined, contracted, rhachis slender, smooth or scaberulous, sharply angled, nodes not or hardly

bearded; spikes 8–20, not regularly smaller upwards, sessile, ½–1 in., longer or shorter than the internodes, rhachis narrow, scaberulous and with a few long white bristles; spikelets $\frac{1}{12}$ in., sessile, secund in 3–5 closely packed series, orbicular-ovoid, more or less hispidly pubescent; glume I about one-third as long as III, orbicular, apiculate, 3-veined, II and III sub-equal, orbicular, membranous, interruptedly 5–7-veined, III paleate, empty, IV turgidly oval or ovoid, acute, coriaceous, polished, pale straw-col'd., obscurely striolate, palea coriaceous; grain ovoid.

Hotter parts of the Island. Spikelets green or purplish.

All warm countries.

The above description is from specimens in the Peradeniya Herbarium, which are very characteristic of the type form of the plants differing from *P. Crus-galli* in the slender stem and panicle, hardly bearded at the nodes, short spikes, with few bristles on the rhachis and smaller spikelets with rather shorter glume III; but no doubt intermediates between these specimens and those of *P. Crus-galli* exist in Ceylon as elsewhere. Ferguson cites it as a synonym of *P. Crus-galli*, with the observation, 'Specimens of the large *Crus-galli* form spring up from seeds thrown out from the bazaars, and become large tufted plants, quite different in appearance from the small wild *P. colonum*.' He does not mention it as a cultivated plant, which it is in India, where Roxburgh observes that he never saw it wild.

7. **P. ambiguum,** *Trin. Gen. Panic.* 155 (1820).

*P. sanguinale*, Burm. Fl. Ind. t. 10 (non descript.). *P. javanicum*, Thw. Enum. 358 (non Poir.). *P. infidum*, Trim. Cat. Ceyl. Pl. 104 (non Trin.). C. P. 858.

Fl. B. Ind. vii. 33. Burm. l. c.

Annual; stem 6 in.–2½ ft., very slender, ascending from a long creeping base, simple or branched, leafy, upper internodes long, nodes puberulous; l. 3–6 by $\frac{1}{6}$–⅓ in., linear, finely acuminate, flat, thin, more or less hairy on both surfaces, scaberulous above and on the margins, smooth beneath, base narrow, midrib slender, sheath 1–3 in., narrow, loose, glabrous or hairy, margin ciliate above the middle, ligule a villously bearded ridge; panicle of 3–4 subterminal, erect, subsessile, slender spikes 1–2½ in. long, rhachis of panicle slender, triquetrous, pubescent at the nodes, rhachis of spike narrow, concave above, dorsally flattened, margins ciliolate; spikelets suberect, loosely biseriately imbricate, binate, a sessile and shortly pedicelled, ⅛–$\frac{1}{6}$ in. long, oblong-ovate, acuminate, glabrous, pedicels pubescent; glumes I and III subequal, oblong-ovate, acute, I 5-veined, nearly as long as III, II ovate-lanceolate, acuminate, 7-veined, III 5-veined, empty, paleate, IV oblong, tip obtuse, aristulate, and palea minutely granulate, thinly coriaceous, dorsally flattened, obscurely 5-veined, awn

concealed within the top of glume III, scabrid, base with a small short obconic stipes.

Hotter parts of the Island; common under coco-nut trees, Colombo. Fl. Nov.; spikelets pale green. Greedily eaten by cattle (Ferguson).

Also in Burma, the Malay, Pacific, and Mascarene Islds.

8. **P. oryzoides,** *Sw. Prod. Fl. Ind. Occ.* 23 (1788).

*P. zizanioides*, H. B. K. Nov. Gen. and Sp. i. 100. *P. Helopus*, var. β, Munro ex Thw. Enum. 358. *P. Helopus*, var. *glabra*, Trim. Cat. Ceyl. Pl. 104. C. P. 3244.

Fl. B. Ind. vii. 39 (*P. latifolium*, Sphalm.). H. B. K. l. c. t. 28 (*P. zizanioides*).

Perennial, nearly glabrous; stem 12–24 in., slender, extensively branched and creeping below, branches ascending, leafy, internodes 1½–1 in., lower sending out solitary wiry roots, nodes glabrous; l. 2–4 by ¼–⅓ in., narrowly lanceolate, acuminate, thin, flat, margins scaberulous, veins 3–5 pairs, base cordate, rarely ciliate, sheaths shorter than the internodes, margins ciliate, ligule obscure; panicle sessile on the uppermost sheath, 1–3 in. long, contracted, subsimple, suberect, rhachis rather stout, angular, nearly smooth, branches very short, distant, erect, few-fld., axils sometimes penicillate; spikelets 1/7–1/6 in., sessile, distant, oval, subacute, glabrous; glumes herbaceous, I–III acute with thickened compressed tips, I about one-fourth to one-third shorter than III, I and II broadly ovate, 5-veined, lateral pairs of veins distant from the central vein, III broader than II, 7-veined, empty, paleate, palea oblong, IV shortly stipitate, ovoid-oval or oblong, acuminate, aristulate, dorsally very convex, smooth, shining, brown, margins narrowly incurved; grain broadly oblong, plano-convex.

Warmer parts of the Island; abundant (Ferguson). Trincomalie (Glenie), Kaltura (Moon). Spikelets green.

Bengal, Burma, Malaya, Trop. Africa, and America.

A very variable grass in India, sometimes very robust, l. longer, panicles much larger and longer, with larger spikelets than in Ceylon specimens. It was only on examining the Peradeniya Herbarium that I recognised this as a Ceylon species. There is, however, a single specimen in Herb. Kew. collected by Walker, on the same sheet with *P. prostratum*. By an unfortunate oversight, this species is in Fl. B. Ind. referred to the American *P. latifolium*, L., with a confused synonymy. It is the *P. latifolium* of Linnes' herbarium, but not of his Sp. Plant.

9. **P. prostratum,** *Lamk. Illustr.* i. 171 (1791).

Thw. Enum. 359. C. P. 965, 3236 (in part).

Fl. B. Ind. vii. 33. Trin. Sp. Gram. Ic. t. 184, 185.

Stem very slender, 4–18 in., ascending from a long creeping base, often branched below, internodes 1–3 in., nodes pubescent; l. 1–2 by ¼–½ in., ovate-lanceolate from a cordate amplexicaul

base, acuminate, thin, flat, faintly scaberulous above, glabrous or ciliate with long white hairs at the base, margins cartilaginous, scaberulous, sheaths slender, 1–2 in., margins ciliate, ligule a brush of white hairs; panicle of 5–8 alternate, secund spikes, rhachis of panicle slender, strict, smooth; spikes $\frac{1}{2}$–$1\frac{1}{4}$ in., sessile or very shortly peduncled, distichously spreading, rhachis very slender, smooth; spikelets $\frac{1}{20}$–$\frac{1}{16}$ in., solitary or binate, loosely bifariously or subtrifariously imbricate, secund, oval, subacute, glabrous, pedicels very short, pubescent, and with a few very long white hairs; glume I very short, not one-fourth of III, semi-lunar, hyaline, veinless, II and III subequal, thin, broadly ovate, acute, II 7-veined, III 5-veined, paleate, empty, palea hyaline, IV oblong, mucronate, dorsally rounded, coriaceous, minutely rugulose, pale, margins narrowly incurved, base forming a very short thickened stipes.

Hotter parts of the Island; common.

Tropics generally.

Thwaites's No. 3236 consists of this and *P. setigerum*, which is easily distinguished by the larger spikelets and large veined glume I. Cattle are fond of it (Ferguson).

10. **P. villosum,** *Lamk. Illustr.* i. 173 (1791).

*P. coccospermum*, Steud.; Thw. Enum. 359. *P. grossarium*, Roxb.; Moon, Cat. 8. C. P. 3241.

Fl. B. Ind. vii. 34.

Annual; stem 6–12 in., very slender, ascending from the root, much branched below, leafy below the middle, softly hairy below, glabrous above, upper internodes long, nodes villously bearded; l. $\frac{1}{2}$–$1\frac{1}{2}$ in., ovate or ovate-lanceolate from a rounded base, acute, flat, thin, softly hairy on both surfaces, margin not cartilaginous, softly ciliate, sheath rather loose, hairy and ciliate, ligule a ridge of hairs; panicle long-peduncled, narrow, of 5–10 alternate secund short sessile or subsessile spikes, rhachis of panicle smooth, angular; spikes 6–8, gradually shorter upwards, $\frac{1}{4}$–$\frac{1}{2}$ in., alternate, rather distant, sessile or peduncled, spreading, rhachis of spikes filiform, flexuous, pubescent and setose with long white hairs; spikelets few, subsessile, $\frac{1}{16}$ in., oval, apiculate, close set, secund in two series; glume I about one-fourth as long as III, orbicular, hyaline, 1-veined, II and III thin, subequal, orbicular, subacute, pubescent, 5–7-veined, III empty, paleate, IV sessile, coriaceous, ovate or oval, acute or apiculate, dorsally rounded, minutely granulate, pale yellow, margins narrowly incurved, base obtuse.

Central Province; upper montane zone, ascending to 6000 ft.

Hill regions of India, Burma, and Tonkin.

11. **P. *muticum,** *Forsk. Fl. Æg. Arab.* 26 (1775).
*P. barbinode*, Trin.; Thw. Enum. 361. C. P. 899.
Fl. B. Ind. vii. 34. Trin. Sp. Gram. Ic. t. 318 (*P. barbinode*).

Perennial; stem stout, 6–8 ft., ascending from a stout creeping base, leafy, internodes 3–6 in. and upwards, nodes woolly; l. 6–10 by $\frac{1}{2}$–$\frac{2}{3}$ in., linear-lanceolate from a rounded pubescent base, finely acuminate, flat, thin, glabrous, faintly scaberulous, margins scabrid, sheath up to 8 in., loose, glabrous, margins eciliate, ligule a tomentose ridge; panicle 3–8 in., erect, pyramidal, compound, rhachis stout, smooth, angular, lower branches 5 in. long with many short spikes, upper 2–3 in. spiciform, rhachis of spike $\frac{1}{20}$ in. broad or more, stout, dorsally compressed, glabrous or villous towards the base, margins ciliolate; spikelets very many, $\frac{1}{10}$–$\frac{1}{8}$ in., crowded, secund, solitary binate or ternate, rarely fascicled, shortly pedicelled, oval or ovoid, acute, glabrous, pedicel pubescent and with a few long white spreading hairs; glume I one-quarter to one-third as long as III, ovate, hyaline, 1-veined; II and III subequal, oblong, acute, thin, 5-veined, III paleate, male, anth. long, purple, IV shorter than III, oblong, obtuse, apiculate, coriaceous, dorsally flattened, obscurely rugulose, margins narrowly incurved, base rounded with a very short broad thickened stipes.

Abundant, cultivated and half wild, in the hotter swampy regions of the Island.

Java, India, Africa, America.

The water-grass and Mauritius grass of Ceylon, native of S. America. Owing to the tendency to branch of the spikes, the inflorescence of this tends towards the broadly panicled section, but the long hairs on the spikes and secund spikelets are very characteristic of sect. *Brachiaria*.

A well-known fodder-grass in Ceylon, but there is no record of its introduction into the Island. According to Roxburgh seeds were received at the Calcutta Botanical Garden from Sumatra in 1804, through Dr. Charles Campbell. As it is a native of Tropical America, the Dutch, who then held ports in Sumatra, may have imported it from Surinam. According to Ferguson, it and *P. maximum* are the two most valuable fodder-grasses in Ceylon. Unlike the latter, *P. muticum* grows best in well-drained low or swampy ground. It is singular that neither Thwaites, Trimen, nor Ferguson give a Sinhalese or Tamil name for it, and that it is not alluded to in Watt's Dictionary of the Economic Products of India.

12. **P. ramosum,** *Linn. Mant.* i. 29 (1771).
*P. Helopus*, Thw. Enum. 436 (non Trin.). C. P. 3847.
Fl. B. Ind. vii. 36. Trin. Sp. Gram. Ic. t. 176, A, B (*C. Petiverii*).

Annual; stem erect or ascending from a shortly creeping base, 1–3 ft. high, slender or rather stout, much branched from the base upwards, puberulous, leafy, lower internodes short, upper long, nodes pubescent; l. 2–5 by $\frac{1}{6}$–$\frac{1}{4}$ in., narrowly

linear-lanceolate from a narrow pubescent base, finely acuminate, thin, flat, smooth, glabrous or pubescent beneath or on both surfaces, margins scaberulous, midrib very slender, sheath 1–3 in., glabrous or pubescent, margins eciliate, ligule a fringe of short hairs; panicle long peduncled, sub-pyramidal, 2–5 in. long, of 5–10 distant, alternate or the lower opposite, secund and many-fld. spikes decreasing in length upwards, rhachis of panicle and spikelets slender, angular, puberulous; spikes erect or spreading, lower 2–3 in. long, strict or flexuous; spikelets loosely imbricate, $\frac{1}{8}$–$\frac{1}{7}$ in., solitary, rarely in pairs with one long-pedicelled, oval, acute, pubescent, pedicel pubescent and setose with a few long white hairs; glume I one-third as long as III, very broadly ovate, subacute, 3–5-veined, II and III subequal, broadly ovate, cuspidately acuminate, 5-veined, III broadest, paleate, empty, palea as long as the glume, oblong, IV ovoid-oblong, acute, rugulose, base with a very short broad stipes.

Trincomalie (Glenie), Colombo, introduced (?), enclosure around Sir E. Barnes' statue (Ferguson).

Plains of India.

Varies remarkably in the breadth of the l.-base; narrow in Ceylon specimens, very broad in some Indian.

13. **P. setigerum,** *Retz. Obs.* iv. 15 (1786).

*P. prostratum*, forma *major*, Thw. Enum. 359. *P. prostratum*, var. *horizontale*, Trim. Cat. Ceyl. Pl. 105. C. P. 3236 (in part).

Fl. B. Ind. vii. 36.

Stems 2–3 ft., prostrate and widely straggling below, branched, slender, firm, internodes 1–2 in., nodes bearded, lower rooting; l. 3–5 by $\frac{1}{2}$–$\frac{3}{4}$ in., ovate-lanceolate from a cordate amplexicaul ciliate base, finely acuminate, flat, thin, midrib very slender, slightly scaberulous above, veins 5–6 pairs, margins scaberulous, sheath with ciliate margins, dorsally tomentose at the top, upper 2–3 in. long, ligule a pencil of long woolly hairs; panicle erect, ovate, of 5–10 sub-erect alternate or opposite distant spikes 1–2 in. long, rhachis slender, glabrous or pubescent, rhachis of spikes slender, angular, base villous; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, loosely imbricate, sessile or shortly pedicelled, biseriate, secund, ovoid, acute or acuminate, glabrous or pubescent, pedicels pubescent and with spreading white hairs longer than the spikelets; glume I one-third as long as III, orbicular-ovate, obtuse, 3-veined; II and III subequal, broadly ovate, acute or acuminate, thin, II 7-veined, III 5-veined, paleate, neuter, palea as long as the glume, subacute, IV sessile, coriaceous, oval, obtuse, mucronate, dorsally compressed, granulate, margins narrowly incurved, base hardly stipitate.

Common in the hotter parts of the Island.

Also in Bengal and the Deccan.

Very closely allied to *P. prostratum*, but a much larger plant, with larger spikelets, and a very different glume I.

14. **P. javanicum,** *Poir. Encycl. Suppl.* iv. t. 274 (1816).

*P. hirsutum*, Kœn. ex Roxb. Fl. Ind. i. 300. *P. Helopus*, Trin. ex Spreng. N. Entdeck. ii. 84.

Fl. B. Ind. vii. 35 (not given for Ceylon). Trin. Sp. Gram. Ic. t. 183 (*P. Helopus*).

Annual; stem 1–2 ft., decumbent and rooting below, geniculately ascending, branching upwards, leafy, nodes pubescent; l. 1–5 by $\frac{1}{5}$–$\frac{2}{3}$ in., ovate-lanceolate from a rounded cordate or amplexicaul base, acuminate, softly hairy on both surfaces, margins scaberulous, midrib slender, veins several pairs, sheath loose, softly hairy, mouth villous, ligule a soft beard; panicle erect, of 6–12 subsecund rather distant many-fld. spikes, rhachis of spike dorsally compressed, ventrally pitted opposite the spikelets, narrow, glabrous or pubescent; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. long, secund, biseriate, loosely imbricate, very shortly pedicelled, ovoid, acute, pubescent tomentose or villous, pedicels pubescent and with a few long silky hairs; glume I not half as long as III, broadly ovate, acute or obtuse, 3–5-veined, II and III subequal, thin, II ovate, acute, 7-veined, III broader, 5-veined, paleate, empty or male, IV broadly ovate or oblong, rugulose, tip rounded, hispid, abruptly awned, awn scabrid, concealed by the glumes, paleas of III and IV nearly as long as the glumes.

Colombo (Ferguson).

Throughout the plains of India. Tropics generally.

The Ceylon specimens are fragmentary but very characteristic, the spikelets are densely tomentose and villous with long hairs towards the margins of glumes II and III. It is a very common Indian grass in the borders of cultivated land and in pastures; its rarity in Ceylon is hence noteworthy. The awned glume IV distinguishes it at once from *P. ramosum.*

15. **P. distachyum,** *Linn. Mant.* i. 138 (1771).

Thw. Enum. 359. C. P. 904.

Fl. B. Ind. vii. 37. Lamk. Ill. t. 43, f. 2. Trin. Sp. Gram. Ic. t. 186 (*P. subquadriparum*).

Stem 6 in.–2 ft., stout or slender, creeping and straggling below, sparingly branched, leafy, internodes long, nodes glabrous; l. 2–6 by $\frac{1}{6}$–$\frac{1}{3}$ in., linear from a rounded or subcordate naked or subciliate base, acuminate, thin, flat, smooth, margins scaberulous, midrib very slender, veins obscure, sheath 1–3 in., glabrous or margins subciliate, ligule a thickened ridge; panicle of 2–6 very distant spreading secund spikes, erect, rhachis slender, angular, smooth; spikes

1–4 in., rhachis slender, dorsally flattened, glabrous, smooth; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in., solitary, alternate, secund, sessile, suberect, distant or loosely imbricate, quite glabrous, oval, subacute, strongly dorsally compressed; glume I about half as long as III, nearly orbicular, hyaline, 5–7-veined, sides overlapping under glume II; II and III subequal, broadly ovate, acute, II 7-veined, III 5-veined, paleate, empty, palea much smaller than the glume, IV sessile, oblong, obtuse, coriaceous, dorsally flattened, minutely striolate-punctulate, pale, base very shortly thickened.

Hotter parts of the Island; common.

Throughout India, Malaya, China, Australia.

A depauperate form or arrested state, collected by Dr. Trimen in the dry region of Mannar, looks different from the ordinary state of the plant, in having a nodose woody rootstock, smaller, broader leaves with cartilaginous margins, and more closely imbricating spikelets. It is analogous to depauperate form of *P. flavidum* from the same district.

16. **P. semiverticillatum,** *Rottler in Ainslie, Mat. Med. Hindost.* Ed. i. 219 (1813), name only.

*P. Petiverii*, Thw. Enum. 359. C. P. 895.

Fl. B. Ind. vii. 38.

Stem 2–3 ft. or more, strict, erect, stiff, polished, simple or sparingly branched, leafy, internodes long, nodes pubescent or the lower glabrous; l. 5–8 in., linear-lanceolate from a rather narrowed rounded pubescent base, finely acuminate, thin, flat, quite smooth, midrib very slender, veins obscure, margins slightly scaberulous, sheaths 2–4 in., tomentose near and round the mouth only, margins eciliate, ligule a pubescent ridge; panicle long-peduncled, 4–8 in. long, of distant, long, spreading, few-fld. spikes, rhachis very slender, angular, more or less pubescent; spikes alternate, secund, 2–3 in. long, rhachis filiform, trigonous, angles glabrous or pubescent; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in., usually distant, subsecund, solitary or binate, subsessile or pedicelled, pedicel sometimes very long or spike reduced to one spikelet on a capillary pedicel, oval, obtuse, glabrous; glume I orbicular-ovate, about one-third the length of III, hyaline, 5-veined, II and III subequal, obtuse or subacute, II 7-veined, III 5-veined, paleate, empty, palea smaller than the glume, IV obovate- or ovate-oblong, subacute or apiculate, coriaceous, dorsally flattened, smooth or most minutely granulate, margins rather broadly incurved, base contracted into a rather long thick stipes.

Central Province, Dambulla (Gardner and Thwaites).

South Deccan.

This plant is referred to Rottler's (undescribed) *P. semiverticillatum* on the faith of specimens so named by Wight, which were collected at Coimbatore, where, according to Ainslie, the plant is cultivated. It is

certainly not the *P. Petiverii* of Trinius (as supposed by Thwaites), which is *P. prostratum.*

17. **P. remotum,** *Retz. Obs.* iv. 17 (1780).
Fl. B. Ind. vii. 39 (not given for Ceylon). Trin. Sp. Gram. Ic. t. 176 f. c. (*P. Petiverii*).

Stems 1–2 ft., often from a woody rootstock, prostrate, straggling, and geniculately branched below, very slender, firm, internodes 1–2 in., nodes glabrous; l. 2–4 in., very narrowly linear from a rounded base, acuminate, flat, smooth, margins smooth, midrib very slender, sheath quite glabrous, upper 1–3 in., ligule a very short glabrous or puberulous ridge; panicle 1–3 in., of few, distant, strict or flexuous, 2–6-fld., almost capillary, spreading spikes $\frac{1}{2}$–1$\frac{1}{2}$ in. long, rhachis of panicle filiform, of spikes glabrous or very sparsely pubescent; spikelets distant, solitary or binate, $\frac{1}{10}$–$\frac{1}{8}$ in., oval, terete, obtuse; glume I about one-third as long as III, orbicular-ovate, 3–5-veined, II and III subequal, ovate, subacute, glabrous or minutely pubescent, 5–7-veined, III 5-veined, paleate, empty, palea smaller than the glume, IV obovoidly oval or oblong, acute, quite smooth, thinly coriaceous, base minutely stipitate.

Northern Prov. Mullaittivu (Ferguson); Kalpitiya Isld., &c., Jaffna distr. (Trimen).

Bengal and the South Deccan.

The Mullaittivu specimens are ticketed in Herb. Perad. '*P. Petiverii*, dwarf creeping form (Hackel).'

18. **P. canaliculatum,** *Nees in Wight, Cat.* n. 1624 (1836).
Steud. Syn. Gram. 55. *P. stenostachyum*, Thw. Enum. 436. C. P. 3845. Fl. B. Ind. vii. 43.

Quite glabrous; stems many from a small hard rootstock, 2–4 ft. long, slender, flaccid, decumbent, rooting below, sparingly branched, leafy, internodes 2–3 in., nodes glabrous; l. 4–6 in., narrowly linear-lanceolate, finely acuminate, flat, thin, flaccid, base narrow, rounded, margins nearly smooth, mid vein rather strong, sheath 1–2 in., margins eciliate, ligule a short ciliate membrane; panicle 4–8 in., very narrow, rhachis filiform, smooth, erect, bearing very short distant (rarely crowded) fascicles or spikes of spreading (rarely solitary) spikelets; spikelets $\frac{1}{8}$ in., shortly pedicelled, oblong, glabrous, pedicels scaberulous; glumes thin, faintly veined, I and II very short, broadly ovate, obtuse, hyaline, I one-fourth to one-third as long as III, 3-veined, II 3-veined, rather longer than I, about half as long as III, which is oblong-ovate, acute, 5–7-veined, paleate, male or empty, palea as long as the glume, linear-oblong, margins broadly inflexed, IV as long as III,

sessile, lanceolate, acuminate, thinly coriaceous, dorsally flattened, 3–5-veined, minutely granulate, tip minutely 3-toothed, margins narrowly inflexed.

Hotter parts of the Island. Jaffna (Herb. Rottler), Trincomalie (Glenie). Also in South India.

A peculiar species, not allied to any other Indian one; easily recognised by the inflorescence and short glume II.

19. **P. nodosum,** *Kunth, Enum. Pl.* i. 97 (1833).
Thw. Enum. 360. *P. Arnottianum*, Nees in Wight, Cat. n. 1611. C. P. 964.
Fl. B. Ind. vii. 43.

Stem 2–3 ft., slender, diffuse, sparingly branched, creeping and rooting below, leafy, internodes $1\frac{1}{2}$–3 in., nodes glabrous; l. 2–5 by $\frac{1}{3}$–$\frac{2}{3}$ in., oblong- or linear-lanceolate, acuminate, thin, flat, somewhat shining, minutely crenulate and ciliate with long hairs at the cordate base, veins 5–9, minutely ciliolate, margins scaberulous, sheath with villously ciliate margins, ligule a crenulate ridge, ciliate with long hairs; panicle 6–8 in., long-peduncled, very slender, of few very long filiform spreading branches, bearing distant, very short, erect, spiciform, 3–6-fld. branchlets $\frac{1}{6}$–$\frac{1}{3}$ in. long, rhachis and branches of panicle smooth or scaberulous towards the tips; spikelets secund on the branchlets, $\frac{1}{8}$ in. long, sessile or shortly pedicelled, linear-oblong, subacute, dorsally flattened, sparsely hairy; glumes I–III membranous, I about half as long as III, broadly ovate, subacute, 3–5-veined, II rather longer than I, 5–7-veined, III ovate-oblong, subacute, 7–9-veined, paleate, empty, IV as long as III, oblong-lanceolate, subacute, dorsally flat, margins broadly incurved, thinly coriaceous, smooth, white, base narrow, very shortly stipitate.

Hotter parts of the Island; abundant in shady places.
Also in S. India, Malaya, and China.

A common and variable grass; attains several feet in height when supported (Ferguson). The Indian specimens differ from Kunth's description of the typical Luzon plant, in the l. sheaths not being tuberculate-hirsute.

20. **P. auritum,** *Presl ex Nees, Agrost. Bras.* 176 (1829).
Thw. Enum. 361. Kunth, Enum. Pl. i. 113. C. P. 3242.
Fl. B. Ind. vii. 40.

Perennial, glabrous; stem 3–12 ft., stout, erect from the base, leafy, roots wiry, nodes glabrous, upper internodes 4–6 in. long, lower sometimes as thick as a goose-quill; l. 8–12 by $\frac{1}{2}$–1 in., narrowly linear-lanceolate, finely acuminate, rather coriaceous, flat, smooth, base cordate, with sometimes a few hairs on the upper surface, margins scaberulous, sheaths smooth, margins naked or ciliolate, ligule a very narrow membrane; panicle

erect, 6–10 in., contracted, very much branched, branches alt. or crowded, subsimple, lower up to 5 in. long, covered from base to tip with crowded, subsecund fascicles of very short racemes of erect, imbricating spikelets, rhachis of panicle and branches angled and channelled, smooth or scaberulous; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., sessile or very shortly pedicelled, oblong-lanceolate, acute, subterete, glabrous; glume I about one-third of III, obtuse or acute, hyaline, strongly 3–5-veined, II and III subequal, thinly herbaceous, ovate-oblong or lanceolate, acute or acuminate, strongly 5-veined, III paleate, neuter, IV as long as III, oblong-lanceolate, acuminate, thinly coriaceous, dorsally convex, quite smooth, white.

Damp places; common. Suffragam district, Ratnapura (Thwaites), Duval Kanda (Moon).

Malaya, China.

In Indian specimens hairy leaves and larger spikelets occur. Ferguson says that it climbs to a height of 10–12 ft. when supported.

21. **P. Myurus,** *H. B. and K. Nov. Gen. and Sp.* i. 98 (1815). *excl. syn. Lamk.*

Thw. Enum. 361. C. P. 3238.

Fl. B. Ind. vii. 39. Beauv. Agrost. t. 10, f. 8 (*Hymenanche Myuros*).

Perennial, quite glabrous; stem 2–6 ft., ascending from a long creeping and rooting or floating rootstock; lower internodes 2–4 in., as thick as a swan's quill, spongy within, emitting fascicles of stout roots several in. long clothed with root-hairs, upper internodes long, strict; l. 12–18 by $\frac{1}{2}$–$\frac{3}{4}$ in., narrowed from above the base to a finely acuminate point, soft, flat, base rounded or subcordate, margin smooth or minutely scaberulous, sheath 2–4 in., margins smooth, ligule very short, truncate or rounded, membranous; panicle 6–10 long by $\frac{1}{4}$–$\frac{2}{3}$ in. diam., strict, erect, rhachis stout, angular, densely covered with the short, erect, appressed, imbricating racemes; spikelets $\frac{1}{6}$–$\frac{1}{4}$ in., very shortly pedicelled, narrowly lanceolate, terete; glume I one-third as long as III, broadly ovate, acute, 3-veined, hyaline, II and III lanceolate, strongly 3-veined, tapering into strict, subulate, scabrid tips, III with a much longer tip than II, neuter, palea small or 0, IV nearly as long as II, oblong-lanceolate, acute, very thin, white, 3-veined; grain very small, oblong, tip contracted, embryo large, orbicular.

Marshy places in the hotter parts of the Island.

Tropical Asia, Australia, and America.

The lowest spikelets are sometimes decurrent on the stem below the panicle. Ferguson says of it, one of the grasses which rapidly spread over shallow bits of water and helps to choke them up. Cattle are fond of it. The almost awned glumes II and III and the very thin fruiting glume IV are characters foreign to the genus.

22. **P. interruptum,** *Willd. Sp. Pl.* i. 341 (1797).
Thw. Enum. 361. Moon, Cat. 7. C. P. 910.
Fl. B. Ind. vii. 40.

Perennial, quite glabrous; stem 2–6 ft., ascending from a very stout, creeping and rooting or floating rootstock, lower internodes 2–4 in., sometimes as thick as the thumb, spongy within, nodes emitting fascicles of long stout roots clothed with root-hairs, upper internodes very long, slender, strict; l. 6–12 by $\frac{1}{4}$–$\frac{1}{2}$ in., linear, finely acuminate, soft, flat, base rounded, hardly contracted, margins smooth or scaberulous, sheaths 2–4 in., margins smooth, ligule short, broad, membranous; panicle 6–12 in. by $\frac{1}{4}$–$\frac{1}{3}$ in. diam., cylindric, interrupted below, rhachis stout, strict, channelled; spikelets $\frac{1}{6}$–$\frac{1}{5}$ in., densely crowded in small fascicles, subsessile or shortly pedicelled, spreading, narrowly ovoid, acute, terete; glumes membranous, I minute, orbicular, hyaline, shortly 3–5-veined, II and III subequal, ovate-oblong, subacute, herbaceous, very strongly veined, II 9-veined, III 7-veined, paleate, male, tip with hyaline margins, palea hyaline; anth. long, narrow; IV shorter than III, ovoid-oblong, subacute, thinly coriaceous, ivory white, polished, dorsally convex, palea as large as the glume; grain obovoid-oblong, plano-convex, pale brown, apiculate, embryo large, orbicular.

Marshes in the hotter parts of the Island; often floating and forming small islands (Ferguson).

Tropical Asia and Africa.

Habit and thin not hardening glume IV of *P. Myurus*, but very different in the form and venation of the glumes.

23. **P. indicum,** *Linn. Mant.* ii. 184 (1771).
Thw. Enum. 361. Moon, Cat. 8. C. P. 885, 908.
Fl. B. Ind. vii. 41. Trin. Sp. Gram. Ic. t. 197; t. 334 (*P. angustum*).

Annual, tufted, glabrous; stem 4 in.–2 ft., erect, or ascending, from a geniculate base, leafy chiefly towards the base, upper internodes long, uppermost usually very slender and naked; l. 2–4 in. by $\frac{1}{10}$–$\frac{1}{6}$ in., erect, linear, acuminate, flat, base narrow or rounded, margins scaberulous, lower sheaths short, upper long, margins naked, ligule 0; panicle $\frac{1}{2}$–3 in. long, spiciform, cylindric, erect, rhachis slender, angular; spikelets $\frac{1}{16}$–$\frac{1}{10}$ in. long, densely crowded, subsessile, pedicel rarely half as long as the glumes, erect or spreading, ovoid, acute, more or less gibbous and decurved, glabrous or hispidulous; glumes very strongly veined, I about half as long as III, ovate, acute, 3–5-veined, margins hyaline, II ovate, incurved, dorsally gibbous, obtuse or subacute, 7–9-veined, III as long as II or rather shorter, oblong, obtuse, 7–9-veined, paleate, empty, palea small, IV much the shortest, oblong or ovoid, acuminate, acute or sub-

acute, thinly coriaceous, dorsally convex, smooth, shining, white, margins strongly incurved, grain oblong, pale reddish.

Var. **brachiatum,** *Hook.* f.

Stem 2–3 ft., as stout as a pigeon's quill, geniculately branching, branches divaricate, elongate, internodes 2–3 in.; l. spreading, 6 by $\frac{1}{4}$ in.; spiciform panicle $2\frac{1}{2}$–3 in.

Abundant throughout the hotter parts of the Island. Spikelets green or purplish. Var. *brachiatum*, Peradeniya (Thwaites).

Tropical Africa.

An extremely variable grass, the dwarf tufted form with short panicle only $\frac{1}{4}$–$\frac{1}{2}$ long on a long peduncle, and l. at the base of the stem, contrasting with the tall, more leafy specimens with long panicle. The leaves are hairy or even villous in some Indian forms.

24. **P. myosuroides,** *Br. Prod.* 189 (1810).

Kunth, Enum. Pl. i. 77. *P. indicum* (in part), Thw. Enum. 361. *P. curvatum*, Roxb. Fl. Ind. i. 286 (non Linn.). C. P. 909.

Fl. B. Ind. vii. 42.

Stem erect or very shortly creeping below, 2–3 ft. high, rather stout, leafy, internodes 3–5 in.; l. very narrowly linear, 6–8 by $\frac{1}{10}$–$\frac{1}{6}$ in., finely acuminate, base narrow, margins smooth, sheath 2–4 in., margins naked, ligule 0; panicle 4–6 in., very narrow, spiciform, $\frac{1}{6}$ in. diam., strict, erect, rhachis terete, smooth; spikelets $\frac{1}{16}$–$\frac{1}{12}$ in., densely crowded in small fascicles, very shortly pedicelled, subglobose, quite smooth; glumes very strongly veined, I nearly half as long as III, ovate, 3-veined, II and III subequal, ovate, obtuse, 9-veined, III broadest, very convex, paleate, empty, IV much smaller than III, ovate-oblong, acute, quite smooth, white, dorsally convex, margins strongly involute.

Caltura (Macrae); Peradeniya (Thwaites).

Trop. Asia, Africa, Australia.

I have described this species from two specimens in Herb. Peraden. They differ from the ordinary Indian state of the plant in the strict, erect, not gracefully curving inflorescence. The species is doubtfully distinct from *P. indicum.*

25. **P. curvatum,** *Linn. Syst. Nat.* Ed. xii. 732 (1767).

Thw. Enum. 360. Moon, Cat. 8. C. P. 3240.

Fl. B. Ind. vii. 42. Kunth, Revis. Gram. t. 107 (*P. coryophorum*).

Stem 10–18 in., very slender, inclined or prostrate below, branched, remotely leafy, branches spreading, internodes 1–2 in., nodes glabrous; l. 2–3 by $\frac{1}{6}$–$\frac{1}{4}$ in., spreading, linear-lanceolate, finely acuminate, flat, membranous, base narrow, rounded, glabrous or sparsely hairy above, margins sub-scaberulous, sheaths 1–3 in., margins glabrous, glabrous or ciliolate ligule; panicle $1\frac{1}{2}$–$3\frac{1}{2}$ in., deltoid, erect, very loosely branched, rhachis filiform, quite smooth, branches solitary

or binate, spreading, capillary, few-fld.; spikelets $\frac{1}{12}$–$\frac{1}{10}$ in., subsolitary, pedicelled, pedicels sometimes as long as the glumes, gibbously ovoid, decurved, glabrous; glume I minute, broadly ovate, veinless, II and III herbaceous, costately closely veined, II cymbiform or almost galeate, subacute, 9–11-veined, base saccately tumid, III much narrower, ovate-oblong, flat, acute, 3–5-veined, paleate, empty, palea linear-oblong, IV sessile, smaller than III, ovoid-oblong, subacute, dorsally convex, coriaceous, quite smooth, shining, pale yellowish, margins narrowly incurved.

Hotter parts of the Island; Kandy, Colombo, Trincomalie, &c.
Southern India, Madagascar, S. Africa.
A very elegant grass, closely allied to *P. indicum*, though differing totally in inflorescence. A good fodder grass; forms a large portion of the fodder collected by the grass-women near Colombo for horses.

26. **P. ovalifolium,** *Poir. Encycl. Supp.* iv. 279 (1797).
Herm. Mus. 6. Burm. Thes. 111. Fl. Zeyl. n. 43. Thw. Enum. 359. Trim. in Journ. Linn. Soc. xxiv. 135. *P. brevifolium*, Roxb.; Moon, Cat. 8. C. P. 889.
Fl. B. Ind. vii. 44. Beauv. Fl. Owar. t. 110, f. 1.

Stem 2–3 ft., decumbent and rooting for the greater part of its length, then ascending, sparingly branched, leafy, glabrous, internodes 1–3 in., nodes glabrous, often emitting long, solitary, wiry roots; l. 1–2½ in., ovate-lanceolate from a cordate amplexicaul base, acuminate, thin, flat, spreading, glabrous or sparsely hairy, basal auricles crenulate and ciliate with long hairs, veins many, very slender, margins scabrid, sheaths long, upper 3 in., margins naked or ciliolate, ligule a ridge of fine hairs; panicle sessile on or shortly exserted from the uppermost l.-sheath, erect, effuse, 3–5 by 1–3 in., broadly oblong or obovoid, rhachis slender, naked or with long spreading hairs, branches very many, erecto-patent, capillary, alternate or the lower fascicled, sparingly divided; spikelets few, distant, erect, $\frac{1}{15}$–$\frac{1}{12}$ in., much shorter than their capillary pedicels, gibbously ovoid, pubescent or hirsute or the terminal on the branches villous with long white hairs; glumes I–III membranous, I nearly as long as III, oblong, obtuse, 3–5-veined, II much broader, galeate, dorsally very convex, often very persistent, III oblong, obtuse, flat, 5-veined, paleate, male, palea large, margins inflected, IV shorter than II, sessile, oblong, acute, coriaceous, smooth, shining, dorsally convex and obscurely keeled, margins narrowly incurved.

Warmer parts of the Island; very common.
Eastern Himalaya, Burma, Malaya, China, Trop. Africa.
Forms a large proportion of the sward near Colombo (Ferguson) Some Indian specimens have much larger spikelets.

27. ***P. miliaceum,** *Linn. Sp. Pl.* 58 (1753). **Wal Meneri,** *S.* **Kadai Kannai,** *T.*

Trim. Cat. Ceyl. Pl. 105. Moon, Cat. 8 (not of Thwaites).

Fl. B. Ind. vii. 45. Host, Gram. Austriac. ii. t. 20. Duthie, Field and Gard. Crops Ind., t. 23.

Annual, more or less clothed with long spreading soft hairs; stems 2–4 ft., stout, tufted, leafy up to the panicle, often as thick as a swan's quill below, internodes clothed with the l.-sheaths, nodes bearded; l. 6–12 by $\frac{1}{2}$–1 in., linear, finely acuminate, flat, flaccid, base truncate or rounded, rarely cordate, margin slightly scabrid, sheath naked or ciliate, deeply grooved, hairs often deflexed, ligule of long hairs; panicle 6–12 in., thyrsiform or oblong, nodding or decurved, branches fascicled, long, filiform or capillary, naked for a great part of their length, scabrid; spikelets $\frac{1}{6}$–$\frac{1}{5}$ in., solitary, erect, pedicelled, ovoid, acute, turgid, pedicel longer or shorter than the spikelet; glumes strongly veined, I about two-thirds of III, broadly ovate, acute, 5–7-veined, II and III subequal, broadly ovate, very convex, cuspidately acuminate, 7–11-veined, III paleate, neuter, palea imperfect, IV shorter than II and III, sessile, broadly oval or ovate, obtuse, crustaceous, smooth, polished, brown, dorsally rounded, 5–7-veined, margins and veins pale, palea crustaceous, convex; grain nearly orbicular, plano-convex, white, embryo small.

Hotter parts of the Island, cultivated only.

Cultivated in all warm countries, especially in Africa.

The *P. miliaceum* of Thwaites's Enum. is *P. trypheron.* Ferguson's *P. miliaceum* (Gram. Ceyl. 9) is probably a mixture of *P. trypheron* and *P. miliaceum.* He says of it, 'The wild form of this grass is not uncommon, and is a low spreading plant. The other is extensively cultivated by the natives as a millet, or fine grain.' He gives as native names Wal-meneri and Meneri. *P. miliaceum* is the Chena of Bengal, where it yields a nutritious grain, but the straw is said to be heating as a cattle fodder.

28. ***P. miliare,** *Lamk. Ill. Gen.* i. 173 (1791). **Menéri,** *S.* **Chámai,** *T.*

*P. menieri,* Kœn. ex Nees, Fl. Afr. Austr. 40. *P. psilopodium,* Trin. Gram. Panic. 217. Thw. Enum. 360. C. P. 236.

Fl. B. Ind. vii. 46. Duthie, Field and Gard. Crops N.W. India, t. 26; Fodd. Grass, t. xlvi. (*P. psilopodium*).

Annual; stems tufted, erect, 1–2 ft. high, rather slender, simple or sparingly branched, leafy up to near the panicle, internodes 2–4 in., nodes glabrous; l. 12–18 by $\frac{1}{6}$–$\frac{1}{3}$ in., erect, narrowly linear, finely acuminate, smooth, glabrous or very sparsely hairy, base narrow, not cordate, margins smooth, sheaths long, eciliate, sometimes with a few tubercle-based hairs, ligule a ridge with a few hairs; panicle oblong, 2–10 in., inclined, rhachis filiform, quite smooth, branches distant, binate

or solitary, suberect, lowest 2–3 in. long, sparingly divided, bearing distant sessile and pedicelled erect spikelets, pedicel rarely twice as long as the spikelet, but sometimes much longer; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in. long, dorsally compressed, ovoid oblong or ellipsoid, acute, glabrous; glume I one-fourth to one-third of III, broadly ovate, broader than long, 5-veined, the pair of veins on each side the mid vein often arching to it, II and III subequal, II orbicular-ovate, acuminate, 11-veined, III 9-veined, paleate, neuter, palea linear-oblong, IV sessile, oblong-ovate, obtuse or subacute, dorsally convex, smooth, yellow or brown, shining, margins broadly incurved.

Cultivated in Ceylon.

Tropical countries.

In Fl. B. Ind. I have followed most authors in keeping *P. miliare* and *P. psilopodium* as different species, assuming that the latter was indigenous in India and Ceylon. Mr. Duthie, who knows the cultivated grasses of India better than any one, has in vain tried to distinguish them (see Fodd. Grasses, p. 10). As *P. psilopodium* it has been considered to be indigenous in the Himalaya, but this requires confirmation.

Ferguson cites *P. miliare*, Lam., as a synonym of *P. miliaceum*, and *P. psilopodium* as a different species; but, as I have stated under the former, I think he has confounded two plants under the name. He mentions *P. psilopodium* as a cultivated plant, adding that the cultivated form of both it and *P. miliare* often spring up in the débris collected from the Colombo bazaars. Unfortunately he does not say how these grains are distinguishable. Watt (Dict. Econ. Prod. Ind.) mentions *P. psilopodium* as a species nearly allied to, or possibly a variety of, *P. miliare*, wild in the Himilaya, but also cultivated. The grain of *P. miliare* he describes as of inferior quality, and mostly consumed by the poorer classes.

29. **P. cæsium,** *Nees in Hook. Kew Journ.* ii. 97 (1850).

*P. reticulatum*, Thw. ex Trim. Cat. Ceyl. Pl. 105 (non Griseb.). C. P. 3890.

Fl. B. Ind. vii. 48.

Annual, glabrous or more or less hairy; stems 2–3 ft., tufted, stout, erect from the root, sometimes as thick as a swan's quill, leafy, internodes long, nodes bearded; l. 6–10 by $\frac{1}{4}$–$\frac{2}{3}$ in., narrowly linear-lanceolate, acuminate, rather coriaceous, glabrous or laxly hairy, chiefly beneath, rarely hirsute, margins scabrid, ciliate towards the subcordate base, sheaths 3–6 in., loose, usually hispid with long spreading hairs, rarely glabrous, margins ciliate, ligule a coriaceous ciliate ridge; panicle 10–18 in. long and broad, glabrous, slender, erect or decurved, rhachis angular, scaberulous, branches 3–5 in., very many, opposite alt. and fascicled, branchlets capillary, wiry, flexuous, bearing few distant solitary or binate spikelets, scaberulous; spikelets $\frac{1}{12}$–$\frac{1}{10}$ in., sessile or pedicelled, pedicel longer or shorter than the spikelet, sometimes very long,

turgidly ovoid or obovoid, obtuse, glabrous; glumes I–III very thin, strongly veined, I one-fourth to one-third of III, deltoidly-ovate, broader than long, subacute, 5-veined, veins reticulate, II and III subequal, orbicular-ovate, obtuse or subacute, 7–9-veined, central veins with a few cross-venules, III paleate, empty, palea as long as the glume, IV sessile, obovoid or oval, obtuse, turgid, dorsally very convex, quite smooth, shining, sub-crustaceous, pale brown, margin narrowly incurved.

Borders of paddy fields. Hewessa, Pasdun Korale.
Bengal, Malacca, Nicobar Is., Malaya.
I find no mention of this grass in either of Mr. Ferguson's papers.

30. **P. trypheron,** *Schult. Mant.* ii. 244 (1824). **Mainairee,** *S.*
*P. miliaceum,* Thw. Enum. 360 (non Linn.). C. P. 882, 893.
Fl. B. Ind. vii. 47.

Annual; stems 1–3 ft., tufted, erect, stout or slender, leafy up to the panicle, internodes 2–5 in., nodes glabrous; l. 3–10 by $\frac{1}{6}$–$\frac{1}{4}$ in., suberect, linear, acuminate, flat, softly hairy on both surfaces, margins nearly smooth, base narrow, often ciliate with long hairs, sheath long, glabrous or hairy, margins eciliate, ligule short, fimbriate; panicle 6–10 in., erect or inclined, broadly oblong, very effuse, rhachis filiform, slightly scabrid, branches very long, capillary, lower fascicled, up to 4 in. long, flexuous, scaberulous, very few-fld.; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., very distant and long-pedicelled, ovoid, acuminate, glabrous; glumes usually spreading, I–III cuspidately long-acuminate, I two-thirds as long as III or more, broadly ovate, 5-veined, II and III unequal, II longest, broadly ovate, strongly 7–9-veined, III like II but shorter, 7-veined, the veins vanishing downwards, paleate, empty, palea linear-oblong, obtuse, IV sessile, oblong, obtuse, dorsally convex, smooth, shining, nearly white or coloured, coriaceous, margin rather narrowly incurved.

Very common, non vulg. 'Manairee' (Thwaites, l. c.). Nilgala, Uva, Jan. 1888 (Trimen).
Plains of India, China, Borneo, Afr. Trop.
Thwaites's Nos. 882, 893, which he supposed to be *P. miliaceum,* are undoubtedly *P. trypheron.* It is hence, perhaps, doubtful to which of these two plants the name Manairee belongs. The Ceylon specimens have a laxer panicle with more flexuous branches than the Indian.

31. **P. humile,** *Nees ex Steud. Syn. Gram.* 84 (1854).
Thw. Enum. 360. C. P. 3243.
Fl. B. Ind. vii. 48.

Annual, densely tufted, quite glabrous; stems slender, 6–12 in. high, erect from the base, leafy nearly up to the panicle, internodes 1–3 in., nodes glabrous; l. erect, strict,

very narrowly linear, 3–6 by $\frac{1}{10}$–$\frac{1}{6}$ in., finely acuminate, margins smooth, base narrow, minutely cordate, sheaths eciliate, ligule of fine soft hairs; panicle 1–4 in. long, erect, effuse, oblong, rhachis very slender, smooth, branches sub-erect, fascicled, capillary, bearing many distant minute spikelets on capillary pedicels $\frac{1}{6}$–$\frac{1}{2}$ in. long; spikelets erect, $\frac{1}{16}$ in., ellipsoid or narrowly ovoid, acute, glabrous; glume I two-thirds as long as III, broadly ovate, acuminate, 3–5-veined, lateral veins often arching and joining the median, II and III subequal, II orbicular-ovate, acuminate, 3–5-veined, 3 middle veins thickened upwards, 2 lateral very short, III shorter than II, more oblong, 5-veined, paleate, neuter, palea broad, obtuse, IV oval-oblong, sessile, obtuse, dorsally convex, shining, pale, thinly coriaceous, margin narrowly incurved.

South of the Island. Spikelets green or purplish.
Throughout the plains of India, Borneo.
The l.-sheaths are occasionally hairy in Peninsular specimens.

32. * **P. maximum,** *Jacq. Ic. Pl. Rar.* i. 2 (1781–6). **Rata-Jana,** *S.*
*P. jumentorum*, Pers.; Thw. Enum. 361 (in note). *P. polygamum*, Sw.; Moon, Cat. 8.
Fl. B. Ind. 49. Jacq. l. c. t. 13, et Eclog. Gram. t. 21 (*P. gongylodes*).

Perennial (?); stem 8–10 ft., tufted, erect, branching upwards, leafy, but not up to the panicle, roots of stout fibres, internodes 6–12 in., nodes bearded; l. 1–2 ft. by $\frac{1}{2}$–1 in., gradually narrowed from a narrow base to a long filiform tip, flat, smooth, glabrous or minutely scaberulous, margins scabrid, base narrow, rounded or cordate, usually villously ciliate with long hairs, sheaths as long as the internodes or longer, glabrous or sparsely hairy, margins naked or ciliate above with long soft hairs, of which the ligule consists; panicle 1–2 ft. long, decompound, erect, rhachis strict, scabrid, branches erecto-patent, capillary, strict, scabrid, lower whorled, upper alternate or whorled; spikelets scattered, distant, $\frac{1}{10}$–$\frac{1}{8}$ in., sessile or pedicelled, elliptic-oblong, obtuse or subacute, glabrous, pedicels capillary, up to $\frac{1}{4}$ in. long; glume I about one-fourth of III, orbicular, hyaline, 0–3-veined, II and III subequal, broadly ovate, subacute, thin, faintly 5-veined, III paleate, empty or male, palea oblong, as long as the glume, IV sessile, narrowly obovoid or oblong, obtuse or acute, coriaceous, dorsally convex, rugulose, margins strongly incurved.

A cultivated fodder grass, occurring in a semi-wild state up to 4000 ft. (Ferguson). Guinea grass.
Native of tropical Africa. Cultivated in most hot countries.

The well-known Guinea Grass was introduced from W. Trop. Africa into Jamaica about 1774, by Mr. John Ellis, as food for some birds which he had imported. The birds died, and the seed, being thrown away as useless, yielded a magnificent grass greedily eaten by cattle and horses. It was introduced into India in 1802 by Sir John Sinclair, and must have been rapidly disseminated, for I find a specimen in Rottler's Herbarium (named *P. meneri*, *miliacea*, var. (?) *P. nodosum*, nob.) received from Heyne, with the date, June 3, 1808. There is no record of its introduction into Ceylon, but it is included in Moon's Catalogue, published in 1824. Ferguson says of it that it grows in almost every soil and situation, and forms with *P. muticum* the two most valuable fodder-plants grown in Ceylon.

Glume III is empty in the only Ceylon specimen that I have examined.

33. **P. repens,** *Linn. Sp. Pl.* Ed. 2, i. 87 (1762). **Etórá,** *S.*
Thw. Enum. 360 (part) (excl. syn. *P. paludosum*). Moon, Cat. 8. *P. ischaemoides*, Retz. Obs. iv. 17. C. P. 883.
Fl. B. Ind. vii. 49. Sibth. Fl. Græc. t. 61.

Perennial; stem 1–3 ft., stout, ascending from a stout often woody branched creeping rootstock, leafy, internodes short or long, nodes glabrous, lower rooting; l. 3–6 by $\frac{1}{4}$–$\frac{1}{3}$ in., subdistichous, narrowly linear-lanceolate, acuminate, strict, rather coriaceous, flat or sides involute, glabrous or hairy above, glabrous often glaucous beneath, base rounded or cordate, margins nearly smooth, sheaths with ciliate margins, especially near the mouth, ligule a coriaceous ridge; panicle shortly exserted from the upper sheath, 3–8 in. long, contracted, branches very many, strict, erect, naked below, slender, angular, nearly smooth, lower 2–3 in. long, not divaricate after flg.; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., sessile or shortly pedicelled, ovoid or oblong-lanceolate, acute, glabrous; glume I about one-sixth of III., orbicular or transversely oblong, white, hyaline, veins 3, faint, or 0, II and III subequal, ovate, acute, II 7-(rarely 5-) veined, III 9-veined, paleate or not, empty or male, palea nearly as long as the glume, IV sessile, oblong, acute, thinly coriaceous, dorsally convex, smooth, nearly white, margins rather broadly involute.

Very common in dry sandy or wet marshy soils, ascending to Nuwara Eliya.

S. Europe, Asia, Africa, America.

A troublesome weed in gardens, but a good fodder-grass. Thwaites gives Attora as the Sinhalese name; Ferguson, Ætora-tawa; Trimen, Etórá. For differences between this and *P. proliferum*, see remarks under the latter. Of the two C. P. numbers cited under this species in Thwaites's 'Enumeratio,' 3049 is *P. proliferum*.

Ferguson says of this grass, 'One of the most common in the Island, and highly valued as fodder for cattle; large quantities brought into and sold in Colombo. Grows equally well in dry sandy soil as it does in marshes or water.'

34. **P. proliferum,** *Lam. Encycl.* iv. 747 (1797).
*P. paludosum*, Roxb. Fl. Ind. i. 307. *P. decompositum*, Br., var. *paludosum*, Trim. Cat. 105. C. P. 3049, 4020.
Fl. B. Ind. vii. 50. Turner, Austral. Grasses i. 36 (*decompositum*).

Perennial; stem 2–3 ft. or more, stout, ascending from a creeping or floating spongy rootstock which is sometimes as thick as the little finger, leafy up to the panicle, simple or branched, internodes short or long, nodes glabrous; l. 6–12 by $\frac{1}{4}$–$\frac{2}{3}$ in., linear or ensiform, acute or acuminate, flat, rather coriaceous, glabrous, base rounded or subcordate, margins minutely scabrid, lower sheaths tumid, usually loose, glabrous, margins eciliate, ligule a ridge of fine hairs; panicle 4–10 in., often as broad when spreading, sessile at the mouth of the l.-sheath, or very shortly peduncled, at first contracted, with few or many erect branches, which are fascicled or whorled below, and at length divaricate, rhachis and branches rather stout, angular, scaberulous, branches strict, naked below, bearing short erect flg. branchlets about the middle; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in., erect, shortly pedicelled, ovate-lanceolate, acuminate; glume I not one-fourth of III, orbicular or reniform, white, hyaline, veins obscure or 0, II and III subequal, broadly ovate, acuminate, II 7-veined, III 9-veined, paleate or not, empty or triandrous, IV sessile, shorter than III narrowly oblong, acute or acuminate, dorsally convex, smooth, white, coriaceous, margins rather broadly incurved.

Marshes, borders of rivers and lakes, in the hotter parts of the Island, often floating.

Tropics of both hemispheres.

It is often difficult to distinguish in a dried state *P. proliferum* from *P. repens.* Over and above the longer, more acuminate spikelets of *proliferum*, it differs in habit, being habitually a water grass, with much stouter stems, prostrate for sometimes several feet, the leaves are more flaccid, usually longer, always flat, the ligule a well-developed ridge of very fine hairs, and the rigid branches of the panicle eventually spread at right angles. I do not find in Herb. Peradeniya specimens marked C. P. 3049 cited in Thwaites's Enumeratio and referred to *P. repens;* those so marked in Herb. Kew. certainly belong to *P. proliferum.* Leaves greedily eaten by cattle.

35. **P. montanum,** *Roxb. Fl. Ind.* i. 313 (1832).
Thw. Enum. 360. C. P. 892.
Fl. B. Ind. vii. 53.

Perennial; stem 3–4 ft. or more, erect from a woody rootstock, branched, stiff, hard, solid, smooth, internodes 2–5 in., nodes glabrous; l. 5–7 by $\frac{3}{4}$–$1\frac{1}{4}$ in., spreading or deflexed from the sheath, narrowed from above a broad cordate base to an acuminate tip, flat, smooth, many-veined, quite glabrous or ciliate at the base only, midrib slender, margins scaberulous,

sheaths shorter than the internodes, glabrous, margins eciliate, ligule of soft long hairs; panicle 8–12 in., effuse, copiously branched, scapiform, the lower branches being as long as the whole panicle, rhachis strict, erect, slender, grooved and smooth below, scabrid upwards, branches very many, whorled, or the upper opp. or alt., lower 6–10 in. long, all suberect or spreading, strict, filiform, scabrid, branches divaricate, capillary; spikelets very distant, $\frac{1}{16}$–$\frac{1}{10}$ in., pedicels long capillary, erect, ellipsoid or oblong, obtuse; glume I a fourth to a third shorter than III, ovate, obtuse 3–5 veined, sparsely hairy and ciliate, hairs very long, II and III subequal, II nearly orbicular, tip rounded, strongly 5-veined, glabrous or very sparsely hairy, III rather shorter and narrower than II, obtuse, 5-veined, epaleate, empty, IV ovoid, subacute, very shortly stipitate, dorsally rounded, smooth, polished, obscurely striolate, pale brown.

Central and Western Provinces (Thwaites, Ferguson), Caltura, Pusella, Bellongalla, Kaduganawa.

Hilly districts of India, Malaya, and China.

In some Indian specimens the leaves are hairy, the midrib excentric, and glands occur in the axils of branches of the panicle. Remarkable for its large open panicle and the height to which it grows when supported (Ferguson).

36. **P. antidotale,** *Retz. Obs.* iv. 17 (1780). **Kirimisastru,** *S.* Thw. Enum. 360. C. P. 971.

Fl. B. Ind. vii. 52. Kunth, Revis. Gram. t. 112 (*P. subalbidum*). Duthie, Indig. Fodd. Grass. t. 3.

Perennial; rootstock stout, creeping, stoloniferous, stem 2–3 ft., rather stout, leafy, solid, internodes 2–4 in., nodes glabrous or puberulous; l. 6–12 by $\frac{1}{3}$–$\frac{1}{2}$ in., linear, very finely acuminate with capillary tips, flat, thin, glabrous, scaberulous on both surfaces and margins, base narrowly cordate, 9-veined, sheaths glabrous, margins eciliate, ligule short, membranous, villously ciliate; panicle 6–8 in. long, effuse, pyramidal, rhachis very slender, slightly scabrid, branches fascicled, lower 3–4 in., filiform, spreading and drooping, much divided, naked below, branchlets capillary; spikelets loosely crowded on the branchlets, $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovoid, acute, glabrous, rather shining; glumes I–III thin, sides membranous, I half as long as III or longer, broadly ovate, obtuse, 3-veined towards the base, II and III broadly ovate, acuminate, 7–9-veined, III shorter than II, paleate, empty, palea oblong, obtuse, IV sessile, ovate-lanceolate, acute, thinly coriaceous, dorsally smooth, white, margins narrowly incurved.

Hotter parts of the Island (Thwaites). Dambulla, by the Temple, cultivated (Ferguson). Spikelets pale brownish.

Also in Afghanistan, the plains of India, Trop. Africa, and Australia.

Often cultivated by the natives for medicine (Ferguson). Watt (Dict. Econ. Prod. Ind. vi. 7) says, 'Used as a disinfectant in smallpox, and in Madras in throat affections,' also that the green young grass has been stated to be poisonous to cattle. In the Ceylon specimens, the nodes and upper parts of the internodes are glaucous.

37. **P. plicatum,** *Lamk. Tabl. Encycl.* i. 171 (1791).
Thw. Enum. 360. Moon, Cat. 8. C. P. 890.
Fl. B. Ind. vi. 55. Jacq Eclog. Gram. i. t. 1. Trin. Sp. Gram. Ic. t. 223.

Perennial; stem 1–8 ft., erect or ascending from a woody branching rootstock, stout, leafy, internodes 2–6 in., nodes strigillose; l. 6–24 by $\frac{1}{2}$–4 in., linear-lanceolate, finely acuminate, chartaceous, scabrid on both surfaces and on the margins, base narrow, elongate, sessile on the sheath and contracted into a slender petiole, veins very many, pinnately inserted on the midrib in the lower third of the l., plicate between the veins, sheaths scaberulous or smooth, eciliate, ligule of long hairs; panicle 1–2 ft., contracted, nodding, rhachis stout, angular, scabrid, branches mostly alternate, distant, lower 3–4 in. long, filiform, suberect, bearing short capillary few-fld. branchlets, and with sometimes setiform scabrid flowerless ones; spikelets $\frac{1}{8}$ in., sessile or shortly pedicelled, ovoid, acute, glabrous; glume I about half as long as III, orbicular-ovate, obtuse, 5–7-veined, II half as long as IV or rather longer, orbicular-ovate, obtuse, veins 7–9, linked by their tips, III longer than II, narrower, acuminate, empty, paleate or not, veins 5, free, palea small; IV shorter than II, ovate-lanceolate, acuminate, dorsally rather flattened, striate, punctulate, white, margins strongly incurved.

Hotter moist parts of the Island, up to 2000 ft.

Hilly parts of India, Burma, Malaya, China.

Some Indian specimens have shorter oval-oblong l., and rougher glume IV.

Another *Panicum* with plicate leaves, *P. flavescens*, Sw. (Fl. B. Ind. vii. 56), has been introduced into cultivated ground in the neighbourhood of Colombo. It is a native of Tropical America.

38. **P. trigonum,** *Retz. Obs.* iii. 9 (*excl. syn. Burm.*) (1783).
Thw. Enum. 359 (in part). C. P. 886 (in part), 888.
Fl. B. Ind. vii. 56.

Perennial; stem very slender, extensively creeping and branching below, branches 6–18 in., ascending, slender or filiform, leafy, glabrous, internodes variable, nodes glabrous, lower emitting very long subsolitary filiform roots; l. $\frac{1}{2}$–3 by $\frac{1}{6}$–$\frac{1}{3}$ in., lanceolate, acuminate, thin, flat, glabrous or

sparsely hairy, striate, base contracted, obtuse or rounded, sometimes with a few long cilia at the base, margins scaberulous, sheaths glabrous or hairy, margins ciliate, especially below the mouth, ligule short, rounded; panicle very various, firm, short, erect, with few short few-fld. branches, or up to 6 in. long, with very distant, solitary, widely spreading capillary branches bearing very few spikelets on capillary pedicel sometimes 1 in. long, rhachis and branches often flexuous, glabrous, quite smooth; spikelets $\frac{1}{16}$–$\frac{1}{12}$ in., gibbous, laterally compressed; glumes I–III pubescent, hispidulous or villous, I about half as long as III, broadly ovate, acute or cuspidate, membranous, 3-veined, II and III 5-veined, obtuse, II galeate, III obovate-oblong, empty, palea rudimentary or 0, IV sessile, semilunar, white, obtuse, laterally compressed, margins not incurved, dorsally rounded, coriaceous, minutely punctulate, shining, palea oblong, coriaceous, dorsally rounded, sides broadly incurved.

Common up to 7000 ft. Spikelets pale brown.
Bengal, S. India, and Java.

A very variable grass in size and in the open or contracted panicle. Thwaites considered both *P. pilipes* and *patens* to be varieties of it, probably rightly. Ferguson regards *pilipes*, *patens*, and *trigonum*, as one species, and says of it, 'Perhaps the most variable grass in Ceylon next to *Spodiopogon obliquivalvis;* also that with *P. ovalifolium* and *P. curvatum* it forms the principal part of the fodder collected by the grass-women for horses in the Cinnamon Gardens.

39. **P. pilipes,** *Nees and Arn. ex Büse in Miq., Pl. Jungh.* iii. 376 (1851–5).

Trim. Cat. Ceyl. Pl. 105. *P. hermaphroditum*, Steud. Syn. Gram. 67. *P. trigonum*, Retz. (in part); Thw. Enum. 359. C. P. 100, 891.
Fl. B. Ind. vii. 57.

Perennial; stem 2–3 ft., rather stout, erect from a creeping base, as thick as a duck's quill or less, leafy, simple or branched, stiff, polished, internodes 3–4 in., nodes glabrous, lower with solitary very stout simple flexuous roots up to a foot long and longer; l. 4–6 by $\frac{2}{3}$–1 in., linear-lanceolate, finely acuminate, spreading, flat, thin, smooth, glabrous, veins 3–4 pairs, and midrib obscure above, slender but prominent and pale beneath, base contracted, rounded, sheaths quite glabrous, eciliate, ligule very short, truncate; panicle 3–7 in., contracted, rhachis smooth, branches distant, alt., erect or suberect, rather stiff, filiform, simple and naked below, with short flg. branchlets above the middle; spikelets $\frac{1}{16}$ in., shortly pedicelled, erect, gibbously obovoid, obtuse, nearly glabrous, pedicels with often long, white, spreading hairs; glumes I–III 3-veined, or III obscurely 5-veined, veins free, I broadly ovate, acute, about

half as long as III, II and III puberulous above the middle, II shorter than IV, galeate, III as long as IV, empty, paleate, palea very small, narrow, acute, IV very gibbous dorsally, contracted below into a stipes, laterally much compressed, coriaceous, smooth, polished, pale brown, tip prominent, with a dorsal tuft of brown hairs, palea narrow, coriaceous, sides involute.

Central Province, in the Forest region. Spikelets pale brown.
Bengal and S. India, Burma, Malaya, Madagascar.
Differs from *P. trigonum*, with which Thwaites united it as a sylvan form, in the much larger stouter habit, nearly glabrous spikelets, and more gibbous pale brown glume IV. *P. trigonum* is, however, quite a small plant, with slender stem, 6–18 in. high, l. $\frac{1}{2}$–3 by $\frac{1}{6}$–$\frac{1}{3}$ in., and a few-fld. panicle with pubescent glumes.

40. **P. patens,** *Linn. Sp. Pl.* 58 (1753).
*P. trigonum* (in part), Thw. Enum. 359. *P. radicans*, Retz. Obs. iv. 18. *P. obliquum*, Roth, Nov. Gen. and Sp. 51. C. P. 886 (in part), 887.
Fl. B. Ind. vi. 56. Burm. Fl. Ind. t. 10, f. 2. Trin. Sp. Gram. Ic. t. 88 (*P. accrescens*).

Stem, 1–2 ft., very slender, branching creeping and rooting below, leafy, internodes very variable, nodes glabrous, lower emitting very long solitary wiry roots; l. 2–6 by $\frac{1}{4}$–$\frac{1}{3}$ in., ovate to linear-lanceolate, finely acuminate, glabrous or ciliate at the base with sometimes tubercle-based hairs, margins and mouth of sheath ciliated, ligule rounded; panicle 2–5 in., usually inclined, effuse or contracted, branches long, distant, naked below, glabrous or puberulous, branchlets and long pedicels capillary; spikelets $\frac{1}{16}$ in. long, glabrous, glumes with ciliate tips; otherwise as in *P. pilipes*.

Central region, Peradeniya, &c. Fl. Feb. Oct.
Hilly districts of Eastern Asia, the Malayan and the Pacific Islands.
C. P. n. 886 is a dwarf form from Nuwara Eliya with l. only $\frac{1}{2}$–1 in. long, and small panicle.

41. **P. sparsicomum,** *Nees ex Steud. Syn. Gram.* 83 (1854).
Fl. B. Ind. vii. 58.

Stem 6–18 in., filiform, flaccid, diffusely branched, branches decumbent and ascending, leafy, internodes 1–2 in., nodes glabrous or pubescent, lower emitting solitary wiry roots; l. 1–2$\frac{1}{2}$ in., narrowly lanceolate, finely acuminate, thin, flat, softly pubescent on both surfaces, 7-veined, base unequal, rounded or subcordate, sheath pubescent, margins ciliate, ligule a ridge of short hairs; panicle long-peduncled, laxly effuse, 4–6 in. long and broad, ped. and filiform rhachis smooth, branches and branchlets alt., distant, widely spreading, capillary; spikelets few, distant, $\frac{1}{20}$–$\frac{1}{16}$ in. long, on long capillary spreading pedicels, glabrous; glumes I–III mem-

branous, I half as long as III, ovate, obtuse, or subacute, 3-veined, II and III strongly 5-veined, II shorter than IV, nearly orbicular, obtuse, III as long as IV, broadly ovate, acute, paleate, empty, palea very small, IV sessile, oval-lanceolate, acute, laterally subcompressed, dorsally very convex, obscurely keeled, quite smooth, thinly coriaceous, margins strongly incurved; grain small, obovoid, plano-convex.

Dry region in the Northern Province. Kokkulai (Heyne, Jany, 23, 1796). Spikelets greenish-brown.

There are two specimens of this very delicate grass in Herb. Peraden. without habitat, date, or collector's name, marked C. P. 886 in Thwaites's writing, which number properly belongs to *P. trigonum*. The minute spikelets are perhaps hardly sufficiently laterally compressed to place this grass in the section with *P. trigonum* and its allies. I have accordingly in the Key to the species referred to it under the section *Effusæ*.

42. **P. uncinatum.** *Radai, Agrost. Bras.* 41 (1823).
Thw. Enum. 359. *Echinolæna polystachya*, H. B. and K. Nov. Gen. and Sp. i. 119. C. P. 710.
Fl. B. Ind. viii. 58. Trin. Sp. Gram. Ic. t. 216. H. B. and K. l. c. vii. t. 679 (*Echinolæna*).

Perennial; stem 1–2 ft., slender, decumbent and rooting below, then ascending, simple or sparingly branched, leafy, lower internodes ½–1 in., upper longer, nodes pubescent, lower emitting long solitary filiform roots; l. 2–3 in., spreading, ovate-lanceolate, acuminate, thin, flat, sparsely pilose on both surfaces with tubercle-based hairs, base narrow, margins scaberulous, veins obscure, sheath pubescent, margins ciliate, ligule short, truncate, membranous; panicle 3–6 in., long-peduncled, contracted, rhachis slender, quite smooth, branches few, distant, alt., erect, filiform, few-fld., lower an inch long, upper shorter; spikelets ⅙ in., gibbously ovoid, laterally compressed, sessile or pedicelled, erect, binate or solitary with a lanceolate bract-like glume (imperfect spikelet) at the base of the pedicels, sometimes in the lower branches all the spikelets are reduced to subulate or lanceolate glumes; glume I rather longer than III, lanceolate, acuminate, 3-veined, glabrous or setose towards the tip, II gibbously ovoid, acuminate, herbaceous, obscurely veined, glandular, naked or furnished, sometimes copiously, with long spreading hook-tipped bristles, margins broadly membranous, III as long as II, orbicular-ovate, obtuse, coriaceous, empty, paleate, palea coriaceous, as long as the glume, lanceolate, finely acuminate, sides involute, IV much smaller than III, sessile, oblong-lanceolate, acuminate, dorsally rounded, smooth, white,

coriaceous, margins strongy incurved, palea narrow; lodicules 0; grain very small, oblong, plano-convex.

Central Province; common in damp shady places.
Trop. Asia and America.

### 5. ICHNANTHUS, *Beauv.*

Annual or perennial grasses; stem creeping and branching below; l. lanceolate; panicle with long slender subspiciform branches; spikelets subsessile, subsecund, solitary, ovate or lanceolate, terete or laterally compressed, articulate at the base, but very persistent; glumes 4, strongly veined, I more than half as long as III, 3-veined, II much longer than III, III and IV 3–5-veined, III paleate, male, IV fem., stipitate, placed transversely to the spikelet, coriaceous, smooth, laterally compressed, stipes flattened, articulate at the base, palea oblong, 2-keeled; lodicules 2, minute; stam. 3; styles free at the base, stigmas exserted at the top of the spikelet; grain enclosed in the deciduous, thickened, smooth glume and palea.—Sp. about 20; 2 in *Fl. B. Ind.*

This genus is scarcely distinct from *Panicum;* its best character is the obliquely tranverse position of the grain, and the persistence of glumes I–III.

**1. pallens,** *Munro in Benth. Fl. Hongkong*, 414 (1861).
Thw. Enum. 361. *Panicum pallens*, Sw. Prod. Fl. Ind. Occ. 23. C. P. 2755.
Fl. B. Ind. vii. 60.

Perennial; stems 1–2 ft., slender, weak, ascending from a creeping base, branching, leafy, glabrous or sparsely puberulous, internodes 2–3 in., nodes glabrous or puberulous, emitting usually solitary long wiry roots; l. 2–6 by $1\frac{1}{2}$–$1\frac{1}{2}$ in., lanceolate, acuminate, tip obtuse, thin, flat, glabrous smooth or scaberulous above, smooth beneath, veins 3–5 pairs very slender, base narrow, rounded or obliquely cordate, margins scabrid, sheath loose, margins ciliate, ligule a ridge of short hairs; panicle 3 in. long, erect or inclined, rhachis slender, smooth, branches erecto-patent, subsecund, alt. or in rather distant fascicles, subspiciform, lower with often distant, imperfect, lanceolate spikelets, rhachis scaberulous; spikelets $\frac{1}{6}$–$\frac{1}{5}$ in., sessile or very shortly pedicelled, glabrous; glume I more than half as long as III, lanceolate, aristately acuminate, 3-veined, keel scaberulous, II and III thin, II lanceolate, acuminate, keel scaberulous, III oval-lanceolate, acuminate, palea as long as the glume, oblong, keels ciliolate, IV much shorter than II and III, oblong, obtuse, base truncate, stipitate, dorsally convex,

smooth, pale, shining, subcrustaceous, margins narrowly incurved, stipes turbinate, not winged, palea oblong.

Central Province. Deltota, alt. 4000 ft. (Thwaites), Knuckles (Ferguson). Bengal, Assam, Tropics generally.

6. **SETARIA,** *Beauv.*

Annual, erect grasses; roots fibrous, stem simple or slightly branched, nodes glabrous; l. linear, finely acuminate, flat, ligule a ridge of hairs; spikelets in contracted, usually cylindric, solitary, terminal panicles, 1–2-fld., not awned, glabrous, articulate on a very short pedicel that bears unilaterally an involucel of one or more rigid scabrid or barbed bristles (branchlets); glumes 4, I–III membranous, 3–5-veined, I half as long as III or shorter, II shorter than IV, III as long as IV, orbicular-oblong, paleate, rarely epaleate, male or neuter, palea hyaline, IV sessile, coriaceous or crustaceous, broadly ovoid, acute, dorsally very convex, smooth or rugulose, sides incurved; grain oblong, free within the hardened glume and palea.—Sp. about 10; 7 in *Fl. B. Ind.*

The species of *Setaria* are variable; I have described the Ceylon ones according to specimens in Herb. Peraden., which do not represent all the forms which several of them assume in continental India. The character of panicle spiciform or more or less branched is often very fallacious.

Panicle spiciform, cylindric.
  Bristles of involucel with erect or spreading teeth 1. S. GLAUCA.
  Bristles of involucel with deflexed teeth . . 2. S. VERTICILLATA.
Panicle more or less lobed or branches elongate.
  Glume IV rugulose all over . . . . . 3. S. INTERMEDIA.
  Glume IV smooth in the upper third . . . 4. S. GRACILLIMA.

1. **S. glauca,** *Beauv. Agrost.* 51 (1812). **Káooloo,** *S.*
Trim. Cat. Ceyl. Pl. 105. *Panicum glaucum,* L.; Thw. Enum. 361. Moon, Cat. 8. *P. helvolum,* L. f., Moon, l. c. C. P. 907.
Fl. B. Ind. vii. 78. Reichb. Ic. Fl. Germ. i. t. 47. Host, Gram. Austriac. ii. t. 16 (*P. glaucum*).

Stem 1–2 ft., erect or ascending, simple or branched, leafy, nodes glabrous, lower rooting; l. 12–18 in., linear, finely acuminate, flat, glabrous or sparsely hairy, base narrow, margins scabrid, sheath smooth; panicle 1–4 in., cylindric, dense-fld., bristles of involucel 6–12, $\frac{1}{4}$–$\frac{1}{3}$ in. long, pale or dark red-brown, scabrid with very short erect or spreading teeth; spikelets $\frac{1}{12}$–$\frac{1}{10}$ in., ovoid, glabrous; glumes I and II very broadly ovate, broader than long, subacute or obtuse, I minute, 3-veined, II as long as IV or shorter, veins 5, arching and

meeting below the tip of the glume, III orbicular, 5-veined, as in II, empty, paleate, palea broadly oval, sides broadly inflexed, IV ovoid, acute, pale, dorsally very convex, closely transversely rugose.

Common all over the Island. Spikes pale or dark red-brown.

Warm and temperate regions.

A very variable plant, which I have described from the Ceylon specimens. Glume III is sometimes triandrous.

2. **S. verticillata,** *Beauv. Agrost.* 57 (1812).

Trim. Cat. Ceyl. Pl. 105. *Panicum verticillatum*, L.; Thw. Enum. 361. C. P. 3246.

Fl. B. Ind. vii. 80. Reichb. Ic. Fl. Germ. i. t. 47. Host, Gram. Austriac. ii. t. 13.

Stem 1–3 ft., stout or slender, erect, leafy, usually branching, internodes 2–4 in.; l. 4–10 in., linear-lanceolate, finely acuminate, flat, smooth, glabrous or sparsely hairy and scaberulous, base very narrow, margins scabrid, sheath smooth, mouth glabrous, ligule a fringe of hairs; panicle 1–3 in., spiciform, cylindric or lobulate towards the base; bristles of involucel one or few, $\frac{1}{6}$–$\frac{1}{4}$ in., pale, scabrid with more or less deflexed teeth; spikelets $\frac{1}{12}$ in., subsessile, ovoid, glabrous; glume I broadly ovate, one-fourth to one-half as long as III, 3-veined, II and III 5-veined, II nearly as long as IV, obtuse, III as long as IV, orbicular-ovate, subacute, paleate, empty, palea very small, IV ovoid, acute, pale green, dorsally very convex, minutely transversely rugulose.

Hotter parts of the Island; abundant in some places. Spikes pale green.

Temp. and trop. regions.

3. **S. intermedia,** *Roem. and Sch. Syst.* ii. 489 (1817).

Trim. Cat. 105. *Panicum intermedium*, Roth; Thw. Enum. 361. C. P. 906.

Fl. B. Ind. vii. 79.

Stem 2–3 ft., very slender, erect or ascending, simple, internodes 3–5 in., nodes glabrous, lower rooting; l. linear-lanceolate, finely acuminate, thin, flat, sparsely hairy on both surfaces, margins scaberulous, base very narrow, sheath long, smooth, mouth villous with soft hairs, margins ciliate; panicle 4–5 in. long, narrowly pyramidal, rhachis glabrous, branches rather distant or upper crowded, all short, lower $\frac{1}{3}$–$\frac{1}{2}$ in. long, dense-fld.; bristles of involucel 3–6, about $\frac{1}{4}$ in. long, very slender, flexuous, minutely denticulate with erect teeth, pale; spikelets $\frac{1}{13}$ in. long, subsessile, ovoid, glabrous; glume I transversely oval, one-third as long as III, 3-veined, III and IV orbicular-oval, veins 5, meeting at the tip of the glume, II about half as long as IV, III as long as IV, paleate,

empty, palea, broadly oval, flaps broad, IV ovoid, acute, brown, dorsally very convex, minutely transversely rugulose all over.

Moist region; not uncommon in damp shady places. Panicle pale green.

Temperate and tropical regions.

4. **S. gracillima,** *Hook. f. Fl. Brit. Ind.* vii. 81 (1896).

Stems 12–18 in., tufted, very slender, almost filiform above, smooth, internodes long; l. 8–12 by $\frac{1}{8}$–$\frac{1}{6}$ in., narrowly linear-lanceolate, finely acuminate, flat, smooth, shortly hairy on both surfaces, base very narrow, margins hardly scabrid, sheath pubescent, margins villously ciliate, ligule a brush of hairs; panicle 2–3 in., on a very long filiform, smooth, puberulous ped., 6–8 in. long, very narrow, rhachis filiform, pubescent, branches $\frac{1}{6}$–$\frac{1}{4}$ in., capillary, flexuous, 2–3-fld.; bristles of involucel 1 or few, $\frac{1}{6}$ in. long, pale, flexuous, minutely scaberulous; spikelets sessile, $\frac{1}{16}$ in. long, broadly ovoid, glabrous; glume I one-fourth to one-third as long as III, broadly ovate, 5-veined, II about one-third shorter than IV, orbicular, 5- rarely 7-veined, III as long as IV, broadly oval, subacute, 5-veined, male, paleate, palea broadly oblong, flaps broad, IV ovoid, acute, pale green, dorsally very convex, transversely rugulose from the lower half or two-thirds, punctulate above it.

Ceylon, *Gardner* (n. 968), in Herb. Kew. Panicle pale green.

A very peculiar-looking species. Dr. Trimen, to whom I sent a fragment, did not know it, but observed that it looked like a starved *S. intermedia*, which is certainly its nearest ally (if it be not a form or variety of it); but, over and above the slender habit, the spikelets are smaller, and glume IV smooth in the upper third.

*S. italica*, Beauv. (Moon, Cat. 8), the Italian Millet, a taller and much stouter species than any of the above, with broader l. and contracted panicles 6 in. long and as thick as the thumb, is cultivated in Ceylon. Ferguson gives it the native names Tanna Hâl, S, Tennay, T, and says of it one of the dry or very fine grains cultivated in India and Ceylon, and considered by the natives to be one of the most delicious of cultivated grains.

## 7. CHAMÆRAPHIS, *Br.*

Glabrous marsh or aquatic grasses; l. narrowly linear-lanceolate; infl. panicled, branches of the panicle filiform, ending in a flexuous awn-like scabrid bristle; spikelets narrowly lanceolate, terete, green, scattered, subsecund, subarticulate but persistent on the very short thickened obconic pedicel, which is subarticulate on the branch; glumes 4, I very small, suborbicular, hyaline, white, veinless, II and III

membranous, green, narrowly lanceolate, II acuminate, 9–11-veined, longer than III, narrowed into a subulate or awned tip, III acuminate, 7-veined, paleate, male, palea smaller than the glume, hyaline, veins obscure, IV much smaller than III, stoutly stipitate, fem., oblong or ovate-oblong, acute, flat, thinly coriaceous, veinless, palea as broad as the glume, acute, veinless; lodicules cuneate; stam. 3, anth. very short; styles free, stigmas laterally exserted, hairs scattered; grain minute, oblong, compressed, free in the coriaceous glume and hyaline palea, embryo large.—Species 5–6? 1 in *Fl. B. Ind.*

**C. spinescens,** *Poir. Encycl.* ii. 189 (1786).
Trim. Cat. Ceyl. Pl. 106. *Panicum asperum*, Kœn.; Thw. Enum. 436. *P. ischæmoides*, Heyne; Moon, Cat. 8.
Fl. B. Ind. vii. 62. Griff. Ic. Pl. Asiat. t. 145 (*Panicum Brunonianum*).

Forming floating masses of much-branched, leafy, ascending stems, 1–2 ft. high; l. 1½–2 in., flat, acuminate, smooth or scabrid, base narrow, sheath elongate, loose, margins eciliate, ligule a ridge of minute hairs; panicle 2–3 in., shortly peduncled, more or less contracted, rhachis and branches angular, sulcate, nearly smooth or scabrid, branches filiform, flexuous, few or many-fld., lower 1–2 in., awn-like tips $\frac{1}{6}$–$\frac{1}{2}$ in., spikelets with their awns $\frac{1}{5}$–$\frac{1}{3}$ in., glume I not one-eighth of III, orbicular, truncate or reniform, white, II smooth or sparsely setose on the sides, awn scabrid sometimes as long as the glume, III from subequal to about one-third shorter than II, finely acuminate or awned, IV about one-fourth of III in length, and much narrower; grain $\frac{1}{16}$ in., obovate-oblong.

A variable plant, of which there are three forms in Herb. Perad.

Var. **aspera,** *C. aspera*, Nees. *Panicum asperum*, Thw. Enum. 436. C. P. 3846.

Tall, rather stout, nodes pubescent, l. very scabrid, panicle 2–3 in., lower branches long, with many spikelets.

Var. **subglabra,** *C. spinescens* var. *subglabra*, Thw. ex Trim. Cat. 106. C. P. 3877.

More slender, nodes glabrous, l. quite smooth, panicle as in var. *aspera.*

Var. **depauperata,** *Hook. f. Fl. B. Ind.* vii. 62. *C. depauperata*, Nees; Trim. Cat. 106. *Panicum sordidum*, Thw. Enum. 443. C. P. 3857.

Stem as in var. *aspera*, nodes puberulous, l. 1 in., quite smooth, panicle 1–1½ in., contracted, branches very short, appressed, with very few usually dull-red spikelets.

Watery places in the hotter parts of the Island. Vars. *subglabra* and *depauperata*. Colombo (*Ferguson*).

India, Malaya, China, Australia. Var. *depauperata*, Bengal and the Deccan.

Ferguson regards *Pan. sordidum* (var. *depauperata*) as a distinct species. Cattle, he says, eat both species.

### 8. **AXONOPUS,** *Beauv.*

Perennial grasses; l. subradical; spikelets in whorled or digitate, terminal spikes, solitary or binate, awned, 2-fld., articulate in their short pedicels, erect; glumes 4, I shorter than III, hyaline, empty, acuminate or aristulate, veins 3, lateral arching to join the median below the tip, II as long as IV, ovate or ovate-lanceolate, empty, acuminate or awned, 5-veined, lateral veins marginal and villous, III as long as IV, oblong-ovate, 5-veined, paleate, male, palea very small, bipartite, segments auricled, IV sessile, bisexual, oblong, narrowed into a slender terminal awn, thinly coriaceous, dorsally flattened, quite smooth, margins glabrous or pubescent, narrowly incurved; palea oblong, 2-keeled, flaps auricled; lodicules flabelliform; stam. 3, anth. linear; styles free, stigmas linear, laterally exserted, shortly penicillate; grain oblong, free within the hardened glume and palea.—Sp. 2; both in *Fl. B. Ind.*

Spikes umbellate . . . . . . . . . 1. A. CIMICINUS.
Spikes digitate . . . . . . . . . 2. A. SEMIALATUS.

1. **A. cimicinus,** *Beauv. Agrost.* 12 (1812).
*Panicum cimicinum*, Retz.; Thw. Enum. 358; Moon, Cat. 8. C. P. 911. Fl. B. Ind. vii. 64. Kunth, Revis. Gram. ii. t. 103 (*Urochloa cimicina*).

Stem 1–2 ft., erect or decumbent at the base, glabrous or hairy, internodes 1–4 in., nodes hirsute, l. 1–3 in., ovate-lanceolate from a broad cordate base, acute or acuminate, flat, glabrous or hairy on both surfaces, margins ciliate with rather distant, long, stiff, white, tubercle-based hairs, sheath glabrous or hirsute, ligule of very short hairs; spikes 3–8, umbellate on the tip of a slender smooth glabrous ped. 2–6 in. long, with sometimes a fascicle of 2 or more lower down on the ped., rhachis filiform, flexuous, scaberulous, naked for the lower third or half, simple or forked; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., erect, subsecund, solitary or binate, loosely imbricate or the lower distant, very shortly pedicelled, ovoid, flattened, pedicels glabrous; glume I about one-third shorter than III, lanceolate, acuminate, veins 3, lateral arching to join the median below the tip, II and III membranous, II acute, III obtuse, IV

thinly coriaceous, oblong, narrowed into a straight scaberulous awn shorter than itself, dorsally flat, margins narrowly incurved, glabrous; anth. dark purple; grain oval, flat.

Warm districts; abundant. Spikelets pale, glistening.
Also in India, Burma, Malaya, China.

2. **A. semialatus,** *Hook. f. Fl. Brit. Ind.* vii. 64 (1896).
*Panicum semialatum*, Br.; Thw. Enum. 358. C. P. 3239.
Fl. B. Ind. l. c. Griff. Ic. Pl. Asiat. t. 145, f. 2 (*Panicum viaticum*).

Stem 1–3 ft., erect, densely tufted, very robust at the base, clothed with villously silky sheaths, lower internodes short, upper very long, nodes villous; l. 8–12 in., mostly subradical, very narrowly linear, acuminate, strict, rigid, glabrous or pubescent, base very narrow, margins flat or involute, nearly smooth, sheath more or less hairy or villous, margin ciliate, ligule a very short ridge of hairs; spikes 2–5, subdigitate, terminating a long strict more or less hairy ped., erect, 3–6 in. long, rhachis rather stout, strict, pubescent, usually flowering to the base; spikelets $\frac{1}{4}$ in. long, solitary or binate, shortly pedicelled, crowded, ovate-lanceolate, subterete, pedicels short, pubescent; glumes all shortly awned, I about one-third shorter than III, triangular-ovate, acuminate, hyaline, margins ciliolate, II broadly ovate, as long as IV, acute, III as long as IV, oblong, margins incurved, ciliate; anth. red-brown, IV lanceolate, narrowed into a scabrid awn one-third shorter than itself, margins narrowly incurved, pubescent, flaps of palea incurved, auricled towards the base.

Common on the patanas, up to 5000 ft.
Hilly districts of Trop. Asia, Australia, S. Africa.

## 9. OPLISMENUS, *Beauv.*

Slender leafy grasses; stems creeping below, branches ascending; l. ovate-lanceolate, acuminate, thin, flat, margins scaberulous, base narrow, auricled on one side, ligule a ridge of long hairs; spikelets solitary or binate, disarticulating at the base, secund on a simple terminal spike or on racemed spikes, subterete, awned; glumes 4, I and II empty, both usually awned, awns straight, I shorter than III, 3–5-veined, II as long or shorter than IV, 5–7-veined, III as long as IV, or longer, 7–9-veined, paleate or not, empty, IV sessile, lanceolate, acute or acuminate, thinly coriaceous, terete, smooth, white, shining, paleate, bisexual, margins broadly incurved, palea 2-keeled; lodicules minute; anth. 3, linear; styles free, stigmas exserted at the top of the glume; grain

oval-oblong, free within the hardened glume and palea.—Sp. few, very variable; 3 in *Fl. B. Ind.*

Awns quite smooth, obtuse . . . . . . 1. O. COMPOSITUS.
Awns microscopically scaberulous.
  Awn of glume I much longer than the glume . 2. O. BURMANNII.
  Awn of glume I not longer than the glume . . 3. O. THWAITESII.

1. **O. compositus,** *Beauv. Agrost.* 54 (1812).

Herm. Mus. 36. Fl. Zeyl. n. 42. *Panicum compositum*, Linn.; Thw. Enum. 359. Moon, Cat. 8. *P. aristatum*, Retz.; Moon, Cat. 8. *P. elatius*, L. f.: Moon, Cat. 8.

Fl. B. Ind. vii. 66. Trin. Sp. Gram. Ic. t. 188, 189, 190 (*Panicum*).

Stem 1–3 ft., sometimes as thick as a crow-quill, branched and creeping below, branches ascending, leafy, roots sub-solitary from the lower nodes, long, wiry; l. very variable, 1–7 in. long, ovate to ovate-lanceolate, finely acuminate, thin, flat, glabrous or more or less hairy or hirsute on both surfaces, base narrow, auricled on one side, sheath glabrous or pubescent, margins ciliate; panicle long- or short-peduncled, 3–10 in. long, drooping, rhachis and rhachis of spikes glabrous or pubescent, deeply grooved; spikes subsessile, few or many, rather distant, short and erect, or long up to 5 in., and decurved, rhachis rather stout; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. (excl. the awn), very shortly pedicelled, secund and more or less bifariously spreading, pedicel pubescent and often setose; glumes I–III glabrous or pubescent, I shorter than III, ovate-lanceolate, ciliate, 3–5-veined, narrowed into a stiff smooth straight awn, $\frac{1}{4}$ in. long or longer, II larger than I, ovate, 7-veined, awn as of I, but shorter, III broadly oblong, obtuse, apiculate, 9-veined, palea narrow, IV shorter than III.

There are six principal forms or varieties of this protean plant in Herb. Peraden.; all may have very short basal leaves, and much reduced erect panicles.

*a.* Stem 3 ft. and upwards, as thick as a crow-quill, glabrous, internodes 3–6 in.; l. 4–7 by 1–1$\frac{1}{4}$ in., glabrous on both surfaces; panicle 10 in. long, spikes 3–5 in., spikelets glabrous, longest awn $\frac{1}{2}$ in. C. P. 913 (in part).

*b.* As in form *a*, but stem and nodes pubescent, sheaths and l. hirsutely tomentose, rhachis of panicle and spikes clothed with spreading hairs, spikelets glabrous. C. P. 913 (in part).

*c.* More slender, 1–2 ft. long, internodes glabrous or nearly so, nodes pubescent; l. 1–3 in., ovate, acuminate, more or less hirsute on both surfaces and on the sheaths; panicle 3–6 in., rhachis and of spikes rather stout, glabrous or nearly so, spikes 1–3 in., spikelets glabrous, longest awns $\frac{1}{6}$–$\frac{1}{4}$ in. C. P. 185.

*d.* Very slender, 12–18 in. long, internodes short and nodes glabrous; l. 2–3 in., ovate- or linear-lanceolate, acuminate, glabrous, sheath glabrous, margins ciliate; panicle 2–4 in., rhachis and of spikes very slender,

glabrous, spikes distant, ½–2 in., spikelets small, rather distant, glabrous, longest awns ⅓ in.

*e.* Habit and infl. of 4, but l. smaller, spikelets smaller, ⅛ in. (without the awns), glumes I–III silkily pubescent.—O. compositus, form 6, a, Fl. B. Ind. vii. 68. Panicum Burmanni, Thw. Enum. 358 (non Retz.). C. P. 3963.

*f.* Stem slender, glabrous; l. 2–3 in. narrowly lanceolate, sparsely hairy above, glabrous beneath; spikelets few, binate, in a simple terminal long-peduncled spike, or a few lowest on a very short lateral branch or spike, glabrous, longest awn ½ in. C. P. 3683.

Throughout the Island. First collected in Ceylon by Hermann, 1660–1667. *a.* Hantane and Ambagamuwa. *b.* Ambagamuwa (Gardner). *c.* Hantane, Ambagamuwa. *d.* Dambulla. *e.* Nalanda. *f.* Nalanda, Trincomalie (Glenie).

All warm countries except Australia.

The widely distributed *O. undulatifolius* (a native of Europe) is a form of this, with a simple terminal spike of sessile spikelets.

2. **O. Burmannii,** *Beauv. Agrost.* 54 (1812).

*Trim. in Journ. Bot.* xxvii. 168. *Panicum Burmanni*, Retz.; Roxb. Fl. Ind. i. 298. *P. hirtellum*, Burm. Fl. Ind. 24 (non L).

Fl. B. Ind. vii. 68. Burm. l. c. t. 13, f. 1. Trin. Sp. Gram. Ic. t. 193.

A very slender, diffusely branched, leafy grass, 6–18 in. high, internodes glabrous, lower short, upper elongate, nodes glabrous; l. ½–1½ in., ovate or ovate-lanceolate, acuminate, glabrous or sparsely pilose with long hairs, sheath glabrous, margins white; panicle 1–2 in., usually long peduncled, ped. and grooved flexuous rhachis filiform, glabrous; spikes few, ⅙–½ in., sessile, few-fld., rhachis trigonous, clothed with erect white bristles as long as the spikelets; spikelets $\frac{1}{10}$ in. (excl. the awns), on very short setose pedicels, secund, solitary or binate, imbricating; glumes I–III hyaline, ciliate, and silkily hairy, I broadly ovate, half as long as III, 3–5-veined, awn ⅙ in., capillary, scaberulous, II about half as long as IV, broadly ovate, 5-veined, awn shorter than that of I, III as long as IV, broadly oblong, obtuse, 9-veined, empty, awn shorter than the glume, palea 0 or very narrow, keels ciliate, IV elliptic-lanceolate, acute.

Low hot region. Trincomalie (*Ferguson*). Mannar Isld. (*Trimen*). Spikelets very pale green.

India, Malaya, China, Japan, Trop. Africa.

I have described this species from Ceylon specimens in Herb. Peraden.

3. **O. Thwaitesii,** Hook. f.

C. P. 3964.

Fl. B. Ind. vii. 68 (*O. compositus*, form 6, c, Fl. B. Ind. vii. 68).

Very slender, diffusely branched, 6–10 in. high, leafy, glabrous, lower internodes short, upper long, nodes glabrous; l. 1–2 in., lanceolate, acuminate, glabrous, sheath glabrous, margins ciliate; panicle 2–3 in., ped. and trigonous flexuous rhachis filiform, glabrous; spikes very few, distant, erect, lower

1 in., upper very short, few-fld., rhachis trigonous, scaberulous; spikelets $\frac{1}{12}$ in., few, solitary or binate, loosely imbricate; glumes I–III hyaline, ciliate and silkily hairy, I shorter than III, broadly ovate, 5-veined, awn not longer than the glume, strict, scaberulous, II as long as IV or longer, ovate-oblong, mucronate, 5-veined, III oblong, obtuse, muticous, 7-veined, paleate, empty, palea linear, keels ciliate, IV lanceolate.

Hot region. Nalande (*Thwaites*, March 1868). Spikelets very pale green.

I advance this as a distinct species with some hesitation. It is very closely allied to *O. Burmannii*, differing in the loosely imbricate spikelets, the slender scaberulous naked rhachis of the spike, which wants the long cilia of *Burmannii*, in the very short awn of glume I, and fewer veins of glumes II and III. It is named '*O. compositus*, very young,' by Trimen in Herb. Peraden., from which the short scaberulous awns and silky spikelets at once distinguish it.

### 10. **PENNISETUM,** *Pers.*

Annual or perennial grasses; l. narrow; infl. spiciform racemes of involucellate clusters of shortly pedicelled spikelets articulate on a rhachis; involucel of unequal, scabrid or plumose, simple or branched bristles; spikelets 1–6 on each involucel, persistent on their pedicels, 1–2-fld., ovoid; glumes 3 or 4, I–III hyaline, I small or 0, II and III subequal, 5–7-veined, awned or not, II rarely absent, III paleate or not, male or empty, IV sessile, coriaceous, bisexual or fem.; lodicules 2; anth. linear; styles free or connate below, stigmas laterally (?) exserted from the glume; grain oblong, free within the hardened glume and palea.—Sp. 100 enumerated; 12 in *Fl. B. Ind.*

Anth.-cells with bearded tips . . . . . . 1. P. TYPHOIDEUM.
Anth-cells naked . . . . . . . . . 2. P. ORIENTALE.

1. **P. *typhoideum,** *Rich. in Pers. Syn.* i. 72 (1807). **Kumba,** *T.* Herm. Mus. 32. Burm. Thes. 111, Fl. Zeyl. n. 44. Trim. Cat. Ceyl. Pl. 106. *Panicum spicatum*, Roxb. Fl. Ind. i. 283. *Penicillaria cylindrica*, Roem. and Sch.; Thw. Enum. 361 (in note). C. P. 946.

Fl. B. Ind. vii. 83. Jacq. Eclog. Gram. t. 17 (*Penic. spicata*). Beauv. Agrost. t. 13, f. 4.

Annual; stem 3–6 ft., erect, simple or branched from the base, stout or slender, sometimes as thick as the middle finger, solid, leafy, upper internodes glabrous or woolly, lower rooting at the nodes; l. 1–3 ft. by $\frac{1}{4}$–2 in., linear to linear-lanceolate, spreading and drooping, flat, glabrous or hairy, base narrow, rounded, margins scaberulous, sheath long, loose, more or less inflated, margins eciliate, ligule a semicircular

ridge with soft hairs; spiciform racemes 6–12 in. long by $\frac{1}{4}$–$1\frac{1}{2}$ in diam., cylindric, obtuse, dense-fld., rhachis stout, hairy or woolly; involucels stipitate, clustered, stipes silky or hispid, bristles $\frac{1}{6}$ in. long, slender, scabrid or more or less ciliate or plumose; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in.; glume I o, II minute, orbicular, ciliolate, III as long as IV, quadrate, 5–7-veined, paleate, empty, palea oblong, puberulous, veins ciliolate, IV oblong, dorsally rounded, smooth, polished; lodicules o; anth.-cells with bearded tips; styles connate at the base; grain obovoid, compressed.

Cultivated in the hot region. Spikes reddish or yellowish-brown. A widely distributed millet in the old world from Italy to China, especially grown in Africa. It is the Bajri of the Hindoos, the Bull-rush Millet of the English. Variable in the size of the spike, length and colour of the invol. bristles, and in the proportions of the glumes. Ferguson says that it was introduced from India into Ceylon, where it is grown by the Tamils, and springs up in rubbish heaps about Colombo. The grain, like Canary seed, was used for feeding the Carrier pigeons which were employed before the introduction of the telegraph in carrying news from Galle to Colombo. Cattle are fond of the straw.

2. **P. orientale,** *Rich. in Pers. Syn.* i. 72.
Kunth, Enum. Pl. i. 162, ii. 117. *Panicum orientale*, Willd.
Fl. B. Ind. vii. 86, not given for Ceylon.

Perennial, 2–3 ft. high; stem suberect from a stout root-stock, leafy, clothed below with withered l.-sheaths; l. 6–12 in. by $\frac{1}{8}$–$\frac{1}{4}$ in., narrowly linear, finely acuminate, flat, smooth, margins scaberulous, ciliate close to the obtuse or truncate base with very long, flexuous hairs, sheath glabrous, margins ciliate, ligule a ridge of very short hairs; spike 6 in. long, inclined, rhachis slender, subterete, involucels loosely packed, shortly stipitate, stipes pubescent, bristles very unequal, longest about $\frac{3}{4}$ in., capillary, flexuous, scaberulous, plumose with long hairs below the middle, base naked; spikelets 2–6 in., each invol. $\frac{1}{6}$ in. long, pedicels pubescent; glume I $\frac{1}{4}$–$\frac{1}{3}$ the length of III, ovate-oblong, obtuse, veinless, II, III, and IV narrowed into slender scaberulous awns, $\frac{1}{4}$–$\frac{1}{3}$ their own length, II one-third shorter than IV, ovate, faintly 3-veined, III as long as IV, ovate-oblong, 5–7-veined, paleate, triandrous, IV narrower than III, membranous, 5-veined, awn recurved, paleas of III and IV as long as the glumes, of III obtuse, of IV acuminate, and sometimes bi-aristulate; anth. long, yellow; style and stigmas long.

Ella Pass, Uva (Trimen, 9th Sept. 1890, introduced ?). Spikelets pale, invol. bristles tinged with purple.

N.W. India, Sindh, the Concan, Behar, W. Asia, and N. Africa.

So many Behar and Concan plants are found in the drier parts of Ceylon, that *P. orientale* may well be indigenous on the Uva Pass.

11. **STENOTAPHRUM,** *Trin.*

Perennial, stoloniferous, leafy, glabrous grasses, with flattened ascending stems from a creeping much-branched rootstock; l. distichous, linear, obtuse, sheath flattened, ligule a ridge with short hairs; inflorescence a terminal, peduncled, linear, dorsally compressed, pseudo-articulate, spiciform, herbaceous rhachis, bearing on one surface one or two parallel rows of oblong cavities, each containing, immersed in it, a short branchlet or spike bearing two or more secund uni- or biseriate spikelets; spikelets sessile, ovate-lanceolate, acuminate, laterally compressed, appressed to the rhachis, 1–8-fld., upper one or more spikelets perfect, lower one or more usually imperfect, rhachis ending in a mucro; glumes 4, I very small, veinless; II about as long as IV, orbicular-ovate, subacute, membranous, 7-veined, III ovate-lanceolate, acuminate, at length coriaceous, paleate, triandrous, IV lanceolate, coriaceous, paleate, bisexual, paleas of III and IV coriaceous, acute, sides involute; lodicules 2, quadrate-cuneate; anth. linear; styles free, stigmas plumose, exserted at the top of the glume; grain oblong, compressed, free within the hardened glume and palea.—Species 3 or 4; 2 in *Fl. B. Ind.*

**S. complanatum,** *Schrank in Bot. Zeit.* iii. Beil. 26 (1824).
Thw. Enum. 361. C. P. 912.
Fl. B. Ind. vii. 90 (*S. glabrum*). Kunth, Revis. Gram. ii. t. 211 (*S. madagascariense*).

Stem 12–18 in., erect or inclined, smooth, leafy, internodes 1–2 in., nodes glabrous; l. 4–6 by $\frac{1}{8}$–$\frac{1}{4}$ in., exactly linear, midrib stout, margins smooth or nearly so, flat, rather coriaceous, base rounded, suddenly strongly contracted at the insertion, sheath very strongly compressed, green, mouth rounded, not auricled, ciliate, ligule a few hairs; peduncle 4–12 in., slightly compressed, smooth; rhachis of infl. 2–5 by $\frac{1}{10}$–$\frac{1}{4}$ in., dorsally convex, margins most minutely serrulate, internodes $\frac{1}{6}$–$\frac{1}{4}$ in., rarely disarticulating, unequally two-lobed, one lobe forming an erect tooth, cavities as long as the internodes, 1–2-seriate; spikes of 4–8 bifariously imbricating, sessile spikelets about $\frac{1}{6}$ in. long; glume I reniform, ciliate, white, II obtuse, ciliate towards the tip, III with a narrow hyaline ciliate margin above the middle, veins obscure, IV terete, acuminate, tip ciliate; anth. yellow; stigmas purple.

Hotter parts of the Island; not uncommon. On moist banks near Colombo, forming a sward (Ferguson).

S. India, Siam, Mascarene Islds., Africa, Trop. Australia.

Varies greatly in size, especially of the rhachis of the infl., which is sometimes as narrow as the flg. spike. In Fl. B. Ind., following Dœll in Mart. Fl. Bras., I regarded the old and new world forms of this plant as one species. They are indeed most closely allied, but Dr. Stapf finds characters in the unequally lobed internodes of the rhachis in the Old World plant, one lobe being produced into a tooth or spine, and the minutely serrulate margins of the rhachis. In the same work this is erroneously stated to inhabit the plains throughout India, whereas it is confined to southern India and Ceylon. According to Ferguson, it is an excellent fodder grass.

### 12. **THUAREA**,* *Pers.*

A perennial, prostrate, widely creeping, diffusely branched, low, leafy, littoral grass; branches short; l. short, flat; infl. a terminal spike enclosed in a spathiform sheath, rhachis herbaceous, base at length accrescent and enveloping the rest of the spike with the spikelets; spikelets few, 2-fld., uniseriate, sessile on the under face of the rhachis, persistent, lower one or two female or bisexual, upper male; male spikelets:—glumes 3 or 4, I minute, hyaline or 0, II and III subequal, broadly oblong, obtuse, pubescent, III paleate, male or neuter, palea hyaline, cleft nearly to the base into two lanceolate ciliate 1-veined segments, IV triandrous, paleate, palea oblong with inflected sides and a truncate-ciliolate tip; anth. small; fem. spikelets:—glumes as in the male, but III empty, IV more coriaceous, palea lanceolate, acuminate, terete; lodicules minute, suborbicular; styles 2, distant, stigmas plumose exserted at the top of the glume; grain free in the hardened glume and palea, but all enclosed in the accrescent base of the spike, forming together a trigonously obconic or turbinate nut with a deep depression on one side of the crown.—Monotypic.

**T. sarmentosa,** *Pers. Syn.* i. 110 (1805).
Thw. Enum. 362 (*Thouarea*). C. P. 3260.
Fl. B. Ind. vii. 91. Kunth, Revis. Gram. i. t. 35. Beauv. Agrost. t. 22, f. 9.

Stems 2–3 ft., slender, smooth, branches erect, 1–2 in.; l. distichous, 1–2 in., spreading, linear-oblong or lanceolate, acuminate, coriaceous, silkily pubescent, base narrow, margins nearly smooth, sheath $\frac{1}{2}$ in., compressed, pale, ligule a ridge of hairs; spikes $\frac{1}{2}$–1 in., 6–8 in. long, subsessile in the spathaceous sheath, deflexed or horizontal; glumes II and III membranous, pubescent and ciliate, 5–7-veined, outer veins distant

* Name.

from the median; fruit $\frac{1}{2}$–$\frac{1}{3}$ in. long and broad, with a deflexed and incurved beak, caducous.

Sea-coast, Tangalle, Columbo. Spikelets pale.

Laccadive, Nicobar, and Malay Islds., Madagascar, Australia, Polynesia.

The fruit, formed of the accrescent hardened base of the spike enclosing the glumes and grain, is very curious; it resembles 'gram,' the seed of *Cicer arietinum.* It becomes forced underground to enable it to ripen (Ferguson).

## 13. SPINIFEX, *L.*

Gregarious, much branched, rigid bushes; stem and branches woody; l. very narrow, rigid, spreading and recurved, thickly coriaceous; infl. diœcious, of large terminal globose bracteate heads with radiating spikes; male heads with many spikelets in each spike, fem. with one only; male spikelets 1–2-fld., distichous, articulate on short pedicels; glumes 4, chartaceous, acute or pungent, strongly veined, I and II empty, III paleate, empty or triandrous, IV thinly coriaceous, paleate, triandrous, paleas of III and IV as long as their glumes, acuminate; anth. linear; fem. spikelets narrower than the male, erect, lanceolate, 1-fld., glumes acute or acuminate, veined as in the male, I longest, III empty; IV thin, dorsally compressed, palea linear-oblong, acuminate; lodicules 2, large, connate below, strongly veined; styles long, connate below, stigmas long, shortly feathery, exserted at the top of the glume; grain clavate, tipped by the long rigid style, free within the hardened glume and palea.—Sp. 4; 1 in *Fl. B. Ind.*

A genus of doubtful affinity.

1. **S. squarrosus,** *Linn. Mant.* ii. 300 (1771). **Maha-rawana-rewula,** *S.*

Thw. Enum. 362. *Stipa spinifex*, Linn. l. c. i. 84. *S. littorea*, Burm. Fl. Ind. 29. C. P. 947.

Fl. B. Ind. vii. 63. Lamk. Ill. t. 840. Rheede, Hort. Mal. xii. t. 75.

A pale grey or glaucous squarrose bush, several feet high and broad, forming an impenetrable scrub; stem as thick as the little finger below, smooth, solid; l. 4–6 in., spreading and recurved, smooth, tapering from the base to the tip, concavo-convex, base not dilated, margins scaberulous, sheath $\frac{1}{2}$–1 in., smooth, margins eciliate, ligule a ridge of short stiff hairs; male infl. up to 8 in. diam.; bracts shorter than the spikes, lanceolate, aristately pungent, flat, chartaceous, midrib very prominent beneath; male spikes 1–3 in., longer than the stout

angular ped., angles and of rhachis scabrid; male spikelets $\frac{1}{2}$ in., smooth; glumes I and II subequal or I shortest, oblong-lanceolate, 7–9-veined, III rather longer, 5-veined, paleate empty or triandrous, IV shorter, narrowly lanceolate, paleas of III and IV as long as the glumes, acuminate, keels of III ciliate, of IV eciliate; fem. infl. up to 10 in. diam.; bracts as in the male, but smaller; peduncle thickened towards the base; fem. spikelet $\frac{1}{2}$–$\frac{2}{3}$ in., narrowly lanceolate; glume I, oblong-lanceolate, veins many, scaberulous, II rather shorter, acute, 7-veined, III like II, 5-veined, empty, palea 0 or imperfect, IV ovate-lanceolate, 5-veined, palea shorter than the glume, acute, keels smooth.

Sandy shores. Fl. May.

Peninsula of India, Burma, Java, China.

Cultivated on the Madras coast for its sand-binding property. Sometimes called water-pink by Europeans. When burning it makes a crackling noise, like salt when thrown into fire. The globose fruiting heads, becoming detached, are propelled by the wind, assisted by the elasticity of the peduncles, with great velocity along the sandy shores, dropping the seeds in transitu. One may be followed by the eye for miles on its journey. They are so buoyant as to float lightly on water, when the upper peduncles, acting as sails, transport them across estuaries. The utility of the plant in resisting the encroachment of the sea has given it the native name of 'Great Bund of Ravena or Rama' (Ferguson).

### 14. **ARUNDINELLA,** *Raddi.*

Annual or perennial grasses; l. narrow; spikelets panicled, terete, articulate on their pedicels or with glumes I and II separately deciduous, 1–2-fld., with the upper fl. always fem., rhachilla not or shortly produced between the three lower glumes; glumes 4, membranous, chartaceous, or thinly coriaceous, III and IV always (?) membranous, I and II empty, strongly veined, acute or acuminate, with a veinless obtuse tip, II longer than I, III shorter than II, faintly 3–7-veined, paleate, male or neuter, rarely bisexual and fruiting, IV much shorter than III and thinner, paleate, fem. or bisexual, sessile, disarticulating at the naked or bearded base, awnless or 1–3-awned, if 3-awned 2 lateral awns capillary straight, median geniculate with a straight or twisted column, paleas of III and IV linear or oblong, 2-keeled, flaps more or less conspicuously dilated or auricled at the base; lodicules 2, minute; stam. 3, anth. linear-oblong; styles free or shortly connate below, stigmas short, laterally exserted; grain very small, oblong, compressed, loose in the membranous glume

and palea or tightly embraced by these, embryo large.—Sp. about 30; 23 in *Fl. B. Ind.*

I retain *Arundinella* in the group of *Panicaceæ*, because of the spikelets always articulate with their pedicels, or with glumes I and II often separately disarticulating, and the uppermost of the flg. glumes being always female or bisexual. The disarticulation of glume IV is, however, a Poaceous character, as is the elongation of the rhachilla between the three lower glumes in some species.

Glume IV 3-awned.
  Annual, l. 1–3 in. . . . . . . . 1. A. AVENACEA.
  Perennial, l. 6–10 in. . . . . . . 2. A. SETOSA.
Glume IV 1-awned (sometimes awnless in *A. laxiflora*).
  Spikelets in short densely crowded villous spikes . . . . . . . . 3. A. VILLOSA.
  Spikelets panicled, glabrous.
    Spikelets very shortly pedicelled . . 4. A. LEPTOCHLOA.
    Spikelets long-pedicelled.
      Panicle 4–8 in., erect . . . 5. A. LAXIFLORA.
      Panicle 12–20 in., drooping . . . 6. A. LAWII.
Glume IV awnless.
  L. base broad, cordate, amplexicaul . . 7. A. BLEPHARIPHYLLA.
  L. base narrow, rounded . . . . . 8. A. THWAITESII.

1. **A. avenacea,** *Munro ex Thw. Enum.* 362 (1864).
*Aira*, 3, Griff. Notul. iii. 55. C. P. 3471.
Fl. B. Ind. vii. 69. Griff. Ic. Pl. Asiat. t. 146, f. iii. (Airoid.).

Annual, weak, slender, straggling, rooting below at the nodes, with ascending leafy stems 12–18 in. high, lower internodes short, upper very long, nodes glabrous; l. 1–1½ in., ovate-lanceolate from an amplexicaul pectinately ciliate 2-auricled base, acute, flat, glabrous or sparsely hairy, deeply closely striate above, faintly 5-veined beneath, basal auricles rounded, decurrent on the sheath, embracing the narrow linear ligule which is ciliate at the tip, margins scaberulous, lower sheaths short, loose, upper long; panicle ½–1 in., ovoid, compact, rhachis and branches very short, scaberulous glabrous or hairy; spikelets ⅙–¼ in., lanceolate, crowded, base articulate but persistent; glumes rather coriaceous, I and II distant at the base, oblong-lanceolate, strongly 3–5-veined, I narrowed into an erect scaberulous awn as long as itself, margins setose above the middle, keel scaberulous, II rather longer, margin setulose above the middle, tip obtuse, ciliate, notched with a short awn in the sinus, III thinner, and rather shorter than II, 3-veined, tip obtuse, dorsally mucronate, paleate, bisexual, IV female, much shorter than III, oblong, terete, thinly coriaceous, hirsute with brown hairs, faintly 3-veined, deeply 2-lobed, 3 awned, side awns straight capillary terminating the triangular lobes, median awn short with a broad dark

brown flat strongly twisted column, and subulate divaricate pale scabrid point, palea of glumes III and IV rather coriaceous, white, linear, 2-toothed, thickened and dorsally hairy between the 2 slender keels, flaps incurved, thickened towards the margins, 2-auricled at the very base; anth. linear; grain loose in glumes III and IV, obovate-oblong, compressed, about $\frac{1}{20}$ in. long, pale brown, smooth, polished, embryo half as long as the grain.

Var. **robusta,** *Hook. f.*

Stem stouter, darker coloured, more leafy, upper nodes shorter, panicle up to $2\frac{1}{2}$ in., spikelets larger.

Swampy places. Suffragam district (Thwaites), Sabaragamuwa Province (Ferguson). Var. *robusta*, Herb. Peraden., without habitat. Panicle pale green.

Bengal, Assam, South India, Burma.

2. **A. setosa,** *Trin. Diss.* ii. 63 (1824).
Steud. Syn. Gram. 114.
Fl. B. Ind. vii. 70.

Perennial; stem 1–3 ft., erect from a hard rootstock, slender, rigid, smooth, naked below, subtuberous at the base, branching and sparingly leafy above, branches erect, internodes 4–6 in., uppermost a foot long, very slender, nodes glabrous; l. 6–10 in., narrowly linear, finely acuminate, coriaceous, smooth, glabrous, margins smooth, flat or incurved, base narrow, rounded, setosely ciliate, sheaths shorter than the internodes, margins ciliate, ligule a very short membrane; panicle 6–12 in., very lax, rhachis very slender, smooth, glabrous, branches 2–6 in., alt., distant, suberect, filiform, simple, straight or flexuous; spikelets $\frac{1}{5}$–$\frac{1}{4}$ in., subsecund, distant, solitary or binate, longer than their slender pedicels, naked or setulose at the base; glume I ovate-lanceolate, subaristately acuminate, 3-veined, keel scaberulous, II longer than I by a fourth or third, oblong-lanceolate, 5-veined, narrowed into a long awn-like truncate point with involute margins, keel scaberulous, III as long as I, narrow, laterally compressed, obtuse 5–7-veined, paleate, male, IV half as long as III, narrowly oblong, acuminate, scaberulous, setulose at the base, faintly 3-veined, 3-awned, lateral awns capillary as long as the glume, median as long as the spikelet, column stout, twisted below the knee, slender and recurved above it, paleas of III and IV linear-oblong, acute, keels and narrowly inflexed flaps glabrous.

Trincomalie, near Fort Ostenburg (Ferguson).

India, Tonkin, China, Philippine Is.

The l. are pubescent or villous in some Indian states of this plant.

3. **A. villosa**, *Arn. ex Steud. Syn. Gram.* 115 (1845).
Thw. Enum. 362. C. P. 960.
Fl. B. Ind. iii. 72.

Perennial; stems 1–2½ ft., densely tufted, unbranched, erect, stiff, smooth, glabrous except near the panicle, base swollen, and sometimes as large as a hazel-nut, clothed with woolly l.-sheaths, internodes very long, uppermost up to a foot, nodes glabrous; l. mostly crowded at the base of the stem, 4–12 in. long, erect, narrowly linear, or almost filform, pungent, coriaceous, glabrous pubescent or villous, smooth, flat or margins involute, base very narrow, woolly, lower sheaths short, upper very long, auricled, auricles rounded, woolly, ligule minute, glabrous; panicle 2–8 in., erect, very narrow, rhachis stout, tomentose, branches spiciform, subsecund, sessile, lower alt. up to 1½ in. long, upper much shorter, densely crowded, all covered from the base to the tip with crowded, imbricating, subsecund, sub-sessile, villous spikelets $\frac{1}{5}$–$\frac{1}{4}$ in. long, pedicels short, hispid with long speading hairs; glumes I and II ovate-lanceolate, 5-veined, veins and margins beset with long tubercle-based hairs, lateral veins nearer the margins, I aristately acuminate, II rather longer, narrowed into an awn-like obtuse point with inflexed margins, III as long as I, oblong-lanceolate, acute, 5-veined, glabrous, paleate, male or neuter, palea with ciliate flaps and nearly smooth keels, IV half as long as III, oblong, obtuse, scaberulous above, 5-veined, base penicillate, abruptly awned, awn as long as the spikelet, geniculate about the middle, column slender twisted, palea oblong-lanceolate, keels smooth, flaps eciliate; grain closely wrapped in the red-brown coriaceous suberulous glumes and palea, oblong, $\frac{1}{14}$ in. long, compressed, pale brown, embryo longer than half the seed.

Abundant in the patanas, alt. 4–6000 ft. Spikelets dusky brown.
Continental India.

4. **A. leptochloa,** *Hook. f. Fl. B. Ind.* vii. 76 (1896).
*Panicum leptochloa*, Nees; Thw. Enum. 360. *P. zeylanicum*, Arn. MSS. C. P. 918.
Fl. B. Ind. l. c.

Perennial; stems 2–3 ft., tufted on a woody rootstock, erect, rather stout, subsimple, leafy, stiff, glabrous, or laxly hairy above, internodes long, upper 6–12 in.; nodes glabrous; l. 6–10 by $\frac{1}{6}$–$\frac{1}{3}$ in., linear-lanceolate, finely acuminate, strict, flat, glabrous or sparsely hairy, margins smooth, ciliate with tubercle-based hairs towards the rounded or retuse base, sheaths long, coriaceous, glabrous or sparsely hairy, margins glabrous or ciliate, upper 6–10 in. long, ligule a

very short membrane; panicle 6–10 in., contracted, rhachis strict, angled and grooved, smooth, spiciform branches 1–4 in., erecto-patent, simple, strict, bearded at the axils, scaberulous; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., rather crowded, subsecund, solitary or binate, glabrous, articulate on the pedicel or not, pedicel rarely longer than the spikelet, base naked; glumes I–III thinly coriaceous, I and II broadly ovate, I subaristately acuminate, 3-veined, glabrous or scaberulous, II rather longer, ovate, acuminate, 5-veined, lateral veins distant from the median, III sessile, longer than I, oblong, acuminate, faintly 5-veined, paleate, male or neuter, IV one-third shorter than III, oval, membranous, hyaline, glabrous, muticous, base quite naked, paleas of III and IV oblong, truncate, flaps very narrow, eciliate, hardly auricled, dorsally faintly tuberculate.

Low country; abundant in the S. of the Island (Thwaites). Colombo, Peradeniya.

Also in Malabar.

Glume IV scaberulous in Malabar specimens. I find no trace of hairs at the base of glume IV. The spikelets are sometimes wholly male, glume III being neuter or having 3 small anthers only, and glume IV having 3 large anthers. In other spikelets glume IV has only a minute ovary. The paleas of glumes III and IV have no or very obscure basal auricles to the flaps.

5. **A. laxiflora,** *Hook. f. Fl. B. Ind.* vii. 75 (1896).

*A. nervosa,* Thw. Enum. 362, non Nees and excl. syn. C. P. 919 (in part), 3782.

Fl. B. Ind. vii. 75.

Annual (?); stem $1\frac{1}{2}$–2 ft., tufted, erect, much branched from the base, slender, leafy, lower internodes 1–2 in., upper much longer, nodes glabrous; l. 4–8 by $\frac{1}{8}$–$\frac{1}{3}$ in., linear-lanceolate, attenuately acuminate, strict, flat, rather coriaceous, smooth, glabrous or softly hairy on both surfaces, margins smooth, base subcordate, sheaths glabrous or hairy, upper very long, auricles small, villous, ligule a short membrane with long silky hairs; panicle sessile or shortly exserted from the upper l.-sheath, 4–8 in. long, erect, effuse, rhachis very slender, branches 2–3 in., capillary, alt. or fascicled, erect or spreading, scaberulous; spikelets $\frac{1}{10}$–$\frac{1}{8}$, solitary, distant, articulate on the capillary pedicels, ovoid, glabrous, pale green, base naked; glumes thinly coriaceous, I and II separately deciduous, broadly ovate, subaristately acuminate, I 3-veined, II about one-third longer, suddenly narrowed into a beak-like truncate membranous tip half as long as the glume, 5-veined, III sessile, linear-oblong, subacute, faintly 5-veined, male, flaps of palea ciliate, obscurely

auricled, IV half as long as III, thin, ovate-oblong, scaberulous, tip obtuse, toothed, base naked or minutely bearded, awn if present about twice as long as the spikelet, column slender, twisted, flaps of scaberulous palea narrow, glabrous, hardly auricled.

Central Province; common from 3000–5000 ft. elevation.
Endemic.

There are awned and awnless forms of this plant, between which I can find no other difference whatever; both occur on the same sheet of Thwaites's C. P. 919 in Herb. Peraden.

6. **A. Lawii,** *Hook. f.*
*A. agrostoides*, Trin.; Fl. B. Ind. vii. 71 (partim).

Perennial; stems tufted, erect from a small woody rootstock, 3–4 ft. high, strict, slender or rather stout, leafy, branching upwards, smooth; l. 8–12 by $\frac{1}{4}$ in., linear, finely acuminate, flat, sparsely hairy on both surfaces, margins nearly smooth, midrib slender, veins faint, sheaths elongate, mouth auricled, ligule a tomentose lunate ridge; panicle 12–20 in., pyramidal, decompound, effuse, glabrous, drooping, rhachis slender, smooth, lower branches up to 6 in. long, in distant fascicles, filiform, spreading, flexuous, subscaberulous, branchlets capillary; spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long, very long-pedicelled, obscurely articulate at the naked base; glumes very thin, I and II rather distant at the base, with scaberulous or ciliate veins, separately deciduous, I shorter than III, ovate, acuminate, 3–5-veined, II broadly ovate, suddenly narrowed into a narrow obtuse beak, 5-veined, lateral veins distant from the median, III $\frac{1}{4}$ shorter than II, oblong, obtuse, faintly 5-veined, lateral veins submarginal, palea oblong, obtuse, with a faint median vein, keels ciliolate, flaps hardly auricled; IV not half II, oblong, obtuse, membranous, hyaline, punctulate, faintly 5-veined, base shortly bearded, awn as long as the spikelet, straight, column articulate above the base, palea oblong, obtuse, puncticulate, keels smooth, flaps dilated below hardly auricled.

Ceylon (Ferguson, in Herb. Peraden.), without locality.
The Concan.

In the Flora of British India this plant was considered to be a form of *A. agrostoides*, Trin., having been so named by Munro (in Herb. Ind. Or. Hf. and T.). Its occurrence in Ceylon has led to a re-examination of it, with the aid of fine specimens collected in the Concan by Mr. Woodrow. The result is that it must rank as a distinct species characterised by its perennial habit, much taller stems, long leaves, and very long drooping elongate pyramidal panicle.

7. **A. blephariphylla,** *Trim. MSS. ex Fl. B. Ind.* vii. 77 (1896).
*Panicum blephariphyllum*, Trim. in Journ. Bot. xxii. (1885), 272.
Fl. B. Ind. l. c.

Perennial; stems 2–3 ft., tufted, tall, stout, leafy from the base upwards, glabrous, upper internode very long, nodes glabrous; l. 12–18 by $\frac{1}{2}$–1 in., linear-lanceolate, acuminate, thin, flat, smooth, glabrous on both surfaces, margins ciliate with long, slender, spreading, tubercle-based hairs, base broad, cordate, semi-amplexicaul, sheath pale, glabrous, membranous, margins ciliolate, ligule 0, or a very narrow membrane; panicle 4–6 in., broadly oblong, rhachis strict, nearly smooth, branches filiform, angular, laxly whorled, spreading or subsecund, subscaberulous, axils hairy; spikelets $\frac{1}{8}$ in., subsecund, subsolitary, as long as their pedicels, ovoid, base naked, articulate; glumes I and II separately deciduous, I one-fourth of II, broadly ovate, acute, 3-veined, II ovate, acuminate, 5-veined, III oblong, subacute, 3-veined, male, paleate, IV about half as long as III, lanceolate, thin, white, scaberulous, not awned, base naked, palea scaberulous.

Margins of woods near the sea. Ruanwelle (Ferguson).
Endemic.

8. **A. Thwaitesii,** *Hook. f. Fl. Brit. Ind.* vii. 77 (1896).
*A. nervosa*, var. Thw. MSS. C. P. 919 (in part), 4019.
Fl. B. Ind. l. c.

Perennial; stems 2–3 ft., tufted, erect, slender, leafy, glabrous, internodes long, uppermost very long, nodes glabrous; l. 4–8 by $\frac{1}{8}$–$\frac{1}{4}$ in., very narrowly linear, finely acuminate, flat or margins involute, coriaceous, quite smooth, glabrous, base narrow, rounded, sheaths long, coriaceous, glabrous, or mouth sparsely hairy, margins membranous, ligule a very narrow hairy membrane or obsolete; panicle 4–8 in., effuse, perfectly glabrous, laxly branched, rhachis slender, smooth, terete or angular, branches in rather distant fascicles, 2–4 in. long, capillary, erecto-patent, sparingly divided; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., solitary or binate, subsecund, articulate on their pedicels, glabrous, base naked, pedicels up to $\frac{1}{4}$ in. long; glumes rather coriaceous, I and II separately deciduous, I orbicular-ovate, subacute, 3–5-veined, II one-third longer or more, broadly ovate, suddenly contracted into a subulate obtuse beak, 5-veined, lateral veins towards the margin, III one-third longer than I, oblong-ovate, obtuse, 5–7-veined, paleate, male or neuter, IV one-fourth shorter than III, fem. or bisexual, oblong, obtuse, rather thickened below the middle, white, minutely scaberulous, awnless, base naked or minutely penicillate, palea of III and IV oblong, obtuse, flaps narrow, hardly auricled.

Ceylon (Walker), Ambagamuwa district (Thwaites, 1862).
Endemic.

Very closely allied to *A. laxiflora*, differing in the much stiffer branchlets of the panicle and pedicels, and broader, thicker glumes I and II. The specimens numbered C. P. 4019 are small, with no habitat attached.

*A. brasiliensis*, Raddi. Ceylon is given as a habitat in Fl. B. Ind. (vii. 73) for this plant, some specimens of *A. laxiflora* having been taken for it. It is a very common and variable species found in both hemispheres, abounds in the hilly districts of India from the Himalayas southward, and may be expected to occur in Ceylon. In habit it is a much stouter plant than *A. laxiflora*, with larger, shorter pedicelled spikelets, but it is very difficult to formulate their differential characters.

### 15. **ORYZA**,* *L.*

Tall, annual or perennial grasses; l. long, narrow, flat; spikelets 1-fld., loosely arranged on the branches of a raceme or panicle, disarticulating from their pedicels, laterally strongly compressed, awned or not, thickened at the base; glumes 1–3, I and II very minute, subulate or 0, III dimidiate-oblong, coriaceous or chartaceous, hard, keeled, 5-veined, the lateral vein forming a thickened margin of the glume, awnless or with a long or short straight terminal awn, which is scabrid and articulate on the glume, palea linear, as long as the glume, 3-veined, coriaceous with membranous margins; lodicules 2, entire or 2-lobed; stam. 6; styles short, free, stigmas penicillate, laterally exserted from the glume; grain narrowly oblong, compressed, closely invested by or adnate to the glume and palea.—Sp. 5 or 6; 5 in *Fl. B. Ind.*

Dr. Stapf, who has made a careful study of the morphology of the spikelets of *Oryza*, informs me that it consists theoretically or normally of 5 glumes, of which the two lowest are very minute, are confluent with the tip of the pedicel, and rarely discernible. The spikelet is hence only apparently articulate with the pedicel, the real articulation being above these two suppressed glumes. The two following glumes, also empty, are always minute, and one, or rarely both, are sometimes suppressed. The palea is very anomalous, being 3-veined and as coriaceous as the uppermost glume. Rarely a sixth glume is produced; it is like the fifth, but narrower and empty; its palea is 2-keeled, as in most grasses. Dr. Stapf refers (in Flora Capens.) the Tribe *Oryzeæ* to the Group *Poaceæ*, and places it near *Pappophoreæ* and *Phalarideæ*.

Spikelets $\frac{1}{3}$ in. long, ligule long . . . . . 1. O. SATIVA.
Spikelets $\frac{1}{5}$ in. long, ligule short.
  Glumes granulate, glabrous . . . . . . 2. O GRANULATA.
  Glumes tesselately punctulate, setulose . . . 3. O. LATIFOLIA.

1. **O. sativa**, *Linn, Sp. Pl.* 333 (1753). **Uru-wi**, *S.*
Roxb. Fl. Ind. ii. 200. C. P. 969.
Fl. B. Ind. vii. 92. Host, Gram. Austriac. iv. t. 325. Mart. Fl. Bras. ii. II. t. 1. Benth. and Trim. Med. Pl. iv. t. 291.

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* Name, ὄρυζα, classical.

Annual or perennial (?); stem 2–4 ft., erect, or with a long stout creeping or floating base, rooting at the nodes, internodes long, smooth, nodes glabrous; l. 1–2 ft. by $\frac{1}{4}$–$\frac{1}{3}$ in. broad, linear, acuminate, scabrid on both surfaces and on the margins, base narrow, sheath 4–6 in., loose, smooth, margins eciliate, mouth with ciliate auricles, ligule long, up to $\frac{3}{4}$ in., lanceolate, bifid or bipartite; panicle 6–8 in., inclined or drooping, contracted, loosely branched, ped. long, smooth, rhachis rather stout, angled and grooved, sparsely scaberulous, branches alternate, or lower fascicled, lower rarely spreading and 2–4 in. long, flexuous, subscaberulous; spikelets $\frac{1}{3}$–$\frac{1}{4}$ in. long, erect; sessile or very shortly pedicelled; glumes I and II not one-fourth as long as III, ovate, acute, coriaceous, white, III awned, faces deeply sulcate, keel nerves and margins ciliate, awn articulate at the base, up to 2 in. long, striate, erect, scabrid, palea acuminate; grain oblong, angular, closely invested by the glume.

Watery places, ascending to 3500 ft. Colombo (Ferguson), Batticaloa (Nevill), S. Prov. Hakmanna (Trimen). Spikelets yellow green, mature pale or pinkish yellow.

India, Burma, Australia.

This is undoubtedly the parent of the cultivated Rice. I can find no characters whereby to distinguish the wild from the ordinary cultivated form. The spikelets are always long-awned. It bears the number C. P. 969 in Herb. Perad. attached to specimens gathered by Gardner at Caramoony, and Thwaites at Kurunegala, but that number is omitted in the 'Index of C. P. numbers' in Thwaites's Enumeratio (p. 455), and his *O. sativa*, C. P. n. 2876, is *O. latifolia.*

2. **O. granulata,** *Nees ex Wall. Cat.* n. 8634 (1848). [PLATE XCVIII.] Steud. Syn. Gram. 3. Trimen in Journ. Bot. xxvii. 168 (1889). Fl. B. Ind. vii. 93.

Perennial; stems 2–3 ft., tufted on a woody rooting rootstock, slender, stiff, as thick as a crow-quill at the base, smooth, internodes long, nodes glabrous; l. 3–6 by $\frac{1}{6}$–$\frac{2}{3}$ in., narrowly lanceolate, acuminate, 5–9-veined, nearly smooth on both surfaces or scaberulous beneath, margins scaberulous, base narrow, sheath smooth, margins eciliate, mouth naked, ligule short, rounded; panicle 2–4 in., with few long branches or reduced to a simple raceme, rhachis and branches angular, smooth; spikelets few, $\frac{1}{7}$–$\frac{1}{5}$ in., shortly pedicelled, subacute, awnless; glume I minute, subulate, II 0, III channelled on the faces, and palea granulate, glabrous.

Hilly places. Kandy (Moon), Wattapat Kande (Ferguson), Nilgala, Uva (Trimen). Spikelets pale green or white.

E. Himalaya, Behar, Malabar, Java.

3. **O. latifolia,** *Desv. Journ. Bot.* i. 77 (1813), var *collina, Hk. f.*
*O. sativa*, var. *collina*, Trim. in Journ. Bot. xxvii. 169 (1839). *O. sativa*, Thw. Enum. 357 (non Linn.). C. P. 2876.
Fl. B. Ind. vii. 93 (*O. latifolia*, var. *collina*). Kunth, Revis. Gram. i. t. 4.

Annual; stems 2–3 ft., tufted, erect, smooth, leafy, internodes long, nodes glabrous; l. 1–2 ft. by $\frac{1}{4}$–$\frac{1}{2}$ in., narrowed from the middle to both ends, finely acuminate, 5–7-veined, almost smooth or scaberulous on both surfaces and margins, base very narrow, sheath long, quite smooth, margins eciliate, ligule short, rounded; panicle 5–7 in., long-peduncled, branches few, distant, alt., erect or spreading, rhachis slender, nearly smooth; spikelets sessile or pedicelled, pedicel rarely half as long as the spikelet; glumes I and II minute, ovate, acuminate or subulate, white, II sometimes 0, III deeply sulcate on both faces, acuminate, or produced into an erect straight capillary awn as long to twice as long as itself, tesselately granulate and setulose, as is the palea.

Rocky hills. Bridle path stream to Allacolla and Tirsa-maha-rama, S. Prov. (Trimen), Kanagalla (Thwaites), top of Wahapot Kande Hill and Balligalā, in Kigalá dist. (Ferguson). Spikelets glaucous grey.

India, Burma, Trop. Afr., and Amer.

A specimen in Herb. Peraden. is ticketed by Thwaites 'Colombo Lake, Moon;' but I think this must be an error, and that *O. sativa* had been confounded with it. Dr. Trimen regards *latifolia* as undoubtedly a small wild form of *O. sativa.* It is known as Hill Paddy.

## 16. LEERSIA, *Sw.*

Tall, perennial, slender, marsh grasses; l. narrow, flat; spikelets 1-fld., in slender contracted panicles, articulate on their pedicels, strongly laterally compressed; glumes I and II 0, III dimidiate-oblong, thinly chartaceous, keeled, not awned, keel pectinately ciliate, 3-veined, or 5-veined, the lateral veins forming the thickened margins of the glume, palea linear, as long as the glume, rigid, margins membranous, 3-veined, dorsally ciliate; lodicules 2; stam. 6; styles short, free, stigmas plumose, laterally exserted from the glume; grain narrowly oblong, free within the glume and palea.—Sp. 7; 2 in *Fl. B. Ind.*

*Leersia* differs from an awnless *Oryza* in which the glumes I and II are suppressed, only in the thinner texture of the flg. glumes and palea. Some species have 3 or fewer stamens.

**L. hexandra,** *Sw. Prod. Veg. Ind. Occ.* 21 (1788). **Layoo,** *S.*
Thw. Enum. 356. *L. ciliata*, Roxb.; Moon, Cat. 7. C. P. 877.
Fl. B. Ind. vii. 94. Host, Gram. Austriac. t. 35. Engl. Bot. t. 2908.

Stems rooting in the mud with floating flexuous branches several feet long, sending up erect or ascending slender leafy

branches 2–4 ft. high, nodes puberulous; l. 6–12 by $\frac{1}{6}$–$\frac{1}{4}$ in., suberect, acuminate, smooth, margins scaberulous, base narrow, sheath nearly smooth, margins eciliate, ligule oblong or rounded, scarious; panicle 2–4 in. long, peduncled, oblong, laxly branched, rhachis filiform and capillary branches smooth; spikelets $\frac{1}{10}$–$\frac{1}{7}$ in., secund toward the ends of the branches, erect, sessile or pedicels short; glume smooth except on the keel and margins.

Common up to 4000 ft., ascending to Nuwara Eliya (6200 ft.) in a dwarf form (Ferguson). Spikelets pale green.

Trop. Asia, Africa, America, and Australia.

### 17. **HYGRORHYZA,** *Nees.*

A floating glabrous grass, stems rather stout, diffusely branched, rooting at the nodes, branches short, erect, leafy, roots in dense masses, clothed with capillary root-fibres, internodes long or short; l. oblong, obtuse; infl. a short shortly peduncled panicle as broad as long, with few widely spreading branches, the lower whorled; spikelets few, $\frac{1}{5}$ in., erect, 1-fld., jointed on the pedicels, but tardily deciduous, lanceolate, long-awned, glumes 2, thinly chartaceous, I narrowed into an erect scaberulous awn about $\frac{4}{10}$ in. long, strongly 5-veined, veins scabrid, ciliate, lateral marginal, palea much narrower, 3-veined, keeled, keel ciliate; lodicules minute, suborbicular; stam. 6, anth. long, very slender; styles free, stigmas feathery, laterally protruded; grain oblong, narrowed at the base, obtuse, free within the glume and palea.—Monotypic.

**H. aristata,** *Nees in Edinb. N. Phil. Journ.* xv. 380 (1833). **Go-jabba,** *S.*

Thw. Enum. 356. *Leersia aristata*, Roxb. Fl. Ind. ii. 308. C. P. 878. Fl. B. Ind. vii. 94 Griff. Ic. Pl. Asiat. t. 139, f. 147, and t. 140 (*Potamochloa Retzii*). Rheede, Hort. Mal. x. t. 12.

Stem a foot long and more, spongy, internodes long or short; l. 1–$1\frac{1}{2}$ in., rather broadest at the rounded or subcordate base, scaberulous above, smooth and glaucous beneath, subcoriaceous, margins nearly smooth, midrib very short, veins very many, slender, sheaths longer than the internodes, smooth, somewhat inflated, margins eciliate, ligule a very narrow membrane; panicle about 2 in. long and broad, triangular, lower branches sometimes deflexed, rhachis and branches slender, stiff, smooth; spikelets very narrow, sessile or pedicelled.

Hotter parts of the Island, floating in marshes, &c.; common. Spikelets pale green.

India, Tonkin.

### 18. **TRACHYS,** *Pers.*

A diffuse, softly villous annual; l. ovate-lanceolate; infl. of 2–3 spikes radiating from the top of a long ped., rhachis broad, herbaceous, jointed, each joint bearing on the under surface at the articulation a solitary, globose, persistent cluster of 2–3 perfect 1-fld. spikelets, surrounded by many short spinescent glumes of imperfect ones; spikelets sessile, persistent on a very short stout branched axis, glabrous; glumes 4, very unequal, I minute, tooth-like, II elongate-subulate, membranous, hyaline, strongly veined, III much the largest, obliquely obovate-oblong, cuspidately acuminate, rigidly coriaceous, 9-many-veined, paleate, empty, sides inflexed below the middle, palea very minute, IV much shorter and narrower than III, linear-oblong, acuminate, chartaceous, smooth, dorsally convex, sides incurved, bi-sexual, palea as long as the glume, acuminate, hyaline, sides inflexed below the middle; lodicules very minute or 0; stam. 3, anth. linear; styles very long, stigmas very slender, penicillate, exserted at the top of the glume; grain oblong, compressed, free within the glume and palea.—Monotypic.

**T. mucronata,** *Pers. Syn.* i. 85 (1805).
Thw. Enum. 362. *Panicum squarrosum*, Retz. Obs. iv. 15. C. P. 3262. Fl. B. Ind. vii. 96. Beauv. Agrost. t. 21, f. 7. Retz. l. c. v. t. 1. Roxb. Cor. Pl. iii. t. 206 (*P. squarrosum*).

Stems many from the root, 6–12 in., rather stout, ascending or prostrate, leafy, glabrous, shining, lower internodes 1–2 in., upper much longer, nodes villous; l. 1–2 by $\frac{1}{4}$–$\frac{1}{2}$ in., acuminate, flat, softly villous on both surfaces, margins smooth, base rounded, sheaths shorter than the internodes, loose, upper 2–3 in. long, inflated, narrowed at the top and base, ligule a ridge of fine hairs; ped. up to 10 in. long, slender, shining; spikes 1–2 in., by $\frac{1}{10}$–$\frac{1}{6}$ in. broad, rhachis rigidly herbaceous with a broad flat midrib and broad veined wings, contracted at the nodes, internodes $\frac{1}{6}$–$\frac{1}{4}$ in. long, sub-quadrate, tardily disarticulating, stipites of spikes $\frac{1}{10}$–$\frac{1}{4}$ in. long, terete, glabrous; clusters of spikelets $\frac{1}{8}$–$\frac{1}{4}$ in. diam., often partially sunk in a concavity of the rhachis; perfect spikelets $\frac{1}{5}$ long or less, imperfect much shorter; glume I very variable, coriaceous or thin, acute, II about one-third shorter than III, 5-veined, 2 veins marginal, margins smooth or ciliolate, palea of III subquadrate, truncate, sides obscurely ciliate, angles at top setose.

Sandy ground near the sea in the N. of the Island; Jaffna, abundant. Also in the Carnatic.

In describing this curious and difficult grass in Fl. B. Ind., I overlooked the very minute palea of glume III. I find also that the spikelets are not truly articulate at the base. Some Indian specimens have longer spikes and nearly glabrous leaves.

19. **TRAGUS,** *Haller.*

A small, perennial, rigid, densely tufted, depressed grass; stems short, leafy; l. small, subdistichously imbricate, flat, ciliate; spikelets in terminal spikes, binate on very short pedicels that are articulate with the rhachis, 1-fld.; glumes 3, I very minute, hyaline, II cymbiform, oblong-lanceolate, thickly coriaceous, empty, strongly 5-ribbed, margins membranous, inflexed, closely embracing III, ribs armed with long stout hook-tipped spines, III bisexual, oblong-lanceolate, acuminate, dorsally compressed, thin, scaberulous, sides incurved, palea nearly as long as the glume; lodicules minute, subquadrate; stam. 3, anth. short, broad; styles 2, free, very long, exserted at the top of the glume, stigmas long, penicillate; grain linear-oblong, free in the glume and palea.—Monotypic.

**T. racemosus,** *Scop. Introd.* 73 (1777).

Trim. Cat. Ceyl. Pl. 106. *Lappago biflora*, Roxb. Fl. Ind. i. 281.

Fl. B. Ind. vii. 97. Duthie, Indig. Fodd. Grass. Ind. t. 14. Host, Gram. Austriac. i. t. 36 (*Lappago*). Reichb, Ic. Fl. Germ. i. t. 30 (*Lappago*).

Stems very many, spreading from the root, ascending, 2–6 in. high, leafy below, nearly naked above, lower internodes very short, upper long, nodes glabrous; l. $\frac{1}{4}$–1 in., usually densely crowded and bifarious in the lower part of the stem (except in drawn up stems), ovate-lanceolate, acuminate, rigidly coriaceous, pungent, flat, smooth, base amplexicaul, margins pectinately ciliate, lower sheaths very short, usually compressed, equitant, of upper l. elongate, terete, ligule a ridge of fine hairs; spike $\frac{1}{2}$–2 in. long, cylindric, rhachis filiform, pubescent; pedicels of each pair of spikelets $\frac{1}{16}$ in., scabrid; spikelets $\frac{1}{8}$ in., acute; glume I appressed to the base of II, spines of II as long as the glume is broad, spreading.

Dry pasture ground, &c. Trincomalie, Mannar district, Southern Prov. at Kirinda.

All warm countries, South Europe.

Three or more spikelets are described as occurring on a single pedicel in this species, but I find 2 only in Indian and Ceylon specimens. Glume I is so minute and hyaline as to be easily overlooked (perhaps not always present). The two spikelets of each pair are inserted close together, facing one another, so as to resemble two glumes of one spikelet. Much longer leaves and spikes occur on Continental specimens.

20. **ZOYSIA,** *Willd.*

A small rigid glabrous grass, with a long wiry creeping rootstock giving off short erect leafing branches terminating in solitary peduncled spiciform racemes; l. distichous, subulate, concave, pungent; spikelets ovoid, laterally compressed, 1-fld., articulate on very short stout pedicels, appressed to a rigid inarticulate rhachis with concave facets opposite the spikelets; glumes 2, I empty, rigidly coriaceous, margins closely appressed, as if connate, and tip membranous, veins 0, II much smaller than and completely enclosed in I, ovate-lanceolate, hyaline, 1-veined, palea linear-oblong, hyaline; lodicules 0; stam. 3, anth. long; styles very long, connate below, stigmas plumose, exserted at the top of the spikelet; grain oblong, free within the glume and palea.—Monotypic.

**Z. pungens,** *Willd. in Ges. Natur. fr. Neue Schrift.* iii. 441 (1801). Thw. Enum. 370. C. P. 948.
Fl. B. Ind. vii. 99. Beauv. Agrost. t. 4.

Rootstock slender, up to 2–3 ft. long; l. 1–3 in., spreading, coriaceous, dorsally rounded, margins incurved, quite smooth; sheath short, ligule a very narrow ciliolate membrane; racemes 1–1½ in. long, strict, erect; spikelets $\frac{1}{10}$ in. long, erect; glume I turgidly biconvex, much compressed at the tip, smooth, polished, dorsally rounded to about the middle, keeled above, keel sometimes scabrid, margins ciliolate, II one-third shorter than I and much narrower, palea linear-oblong, veinless.

Sandy shores; common.
Tropical Asia, Australia, Mauritius.
Helps with *Remirea* and other *Cyperaceæ* to bind the coast sands.

21. **LOPHOLEPIS,** *Dcne.*

A tufted, glabrous grass; stems sparingly leafy; l. small, ovate or ovate-lanceolate, flat; spikelets very minute, like the head of a bird, in a spiciform raceme, shortly pedicelled, pedicels articulate close above the rhachis; glumes 3, I and II empty, I coriaceous, incumbent on II, formed of a globose base and narrow elongate limb, base and keel of limb crested by a narrow cartilaginous wing which is pectinately ciliate with long hook-tipped spinules, limb narrowly cymbiform, acute, II much smaller than I, coriaceous, lanceolate, acute, keel crested like I, III bisexual, most minute, broadly oblong, hyaline, palea broad, obtuse, hyaline; lodicules 0; stam. 2, anth. large; styles 2, free, short, stigmas

short, laterally exserted, penicillate; grain free, conical, obtuse, concave in front, base gibbously incurved.—Monotypic.

**L. ornithocephala,** *Dcne. in Archiv. Mus. Par.* i. 147 (1839) in nota.
*Holboellia ornithocephala*, Wall. in Hook. Bot. Misc. ii. 144.
Fl. B. Ind. vii. 98. Wall. l. c. t. 76.

Stem erect or ascending, 6–18 in. high, simple or sparingly branched, smooth, polished, lower internodes about 1 in. or shorter, upper long, nodes glabrous; l. $\frac{1}{2}$–1 in., acuminate, smooth, margins ciliolate, base cordate, sheaths usually shorter than the internodes, smooth, mouth not auricled, ligule a very narrow membrane; raceme 2–4 in., cylindric, dense-fld., rhachis slender, strict, glabrous, pedicels about $\frac{1}{16}$ in. long, spreading, hispidulous, thickened under the spikelet, but not articulate; spikelets $\frac{1}{15}$ in. long, adnate by a broad oblique base to the pedicel; glume I minutely tuberculate, III about one eighth of the length of II, persistent, grain when ripe apparently much longer than glume III.

Mannar Isld., on hot sand, under palms (Trimen, Feb. 1890). Spikelets green, at length red-brown.

Also a native of the South province of the Deccan, where it was first found by Kœnig.

The most *bizarre* of grasses in the form of the spikelets.

## 22. PEROTIS, *Ait.*

A small, densely tufted, rigid grass, root-fibres wiry; stem erect or ascending; l. very short, ovate or ovate-lanceolate, pungently acuminate, ciliate; spikelets minute, terete, articulate on the very short pedicels of a spiciform raceme, linear-lanceolate; glumes 3, I and II empty, equal, linear-oblong, membranous, with a strong midrib produced into a very long capillary awn, III minute, hyaline, ovate-lanceolate, 1-veined, palea smaller, oblong, hyaline, veinless; lodicules 2, quadrate; stam. 3, anth. short; styles very short, connate at the base, laterally exserted, stigmas very short, plumose; grain linear, terete, subacute, as long as and free in the two empty glumes.—Monotypic.

**P. latifolia,** *Ait. Hort. Kew.* i. 85 (1789).
Herm. Mus. 6. Burm. Thes. 105. Fl. Zeyl. n. 25. Thw. Enum. 369. Moon, Cat. 7. *Anthoxanthum indicum*, L. Sp. Pl. 28. C. P. 3164.
Fl. B. Ind. vii. 98. Beauv. Agrost. t. 4, f. 9. Kunth, Revis. Gram. t. 92.

Stem very short, stout, branching from the base, branches some very short, leafing only, others 3–10 in. high, ascending, leafy below, sheathed above, ending in a slender crinite raceme; l. $\frac{1}{2}$–1 in., flat, ovoid, spreading, glaucous green,

striate, base cordate, amplexicaul, midrib 0, sheath of lower l. very short, of upper long, ligule 0; raceme 1–8 in. long, often flexuous, rhachis very slender, not articulate, glabrous; spikelets crowded, $\frac{1}{10}$ in. long, rhachilla 0; glumes I and II with minutely scabrid awns $\frac{1}{3}$–$\frac{1}{2}$ in. long and ciliate keels, I hispidulous, tip entire or minutely notched, II glabrous, except the ciliate keel, III about $\frac{1}{3}$ as long as I and II, excessively thin.

Hotter parts of the Island; abundant, especially in sandy soil.
Afghanistan, Trop. Asia, Africa, and Australia.

Remarkable for its long bottle-brush-like raceme of metallic-coloured flowers (Ferguson). The spikes vary from green to red-brown.

### 23. LEPTASPIS, *Br.*

Perennial, monœcious grasses; rootstock creeping; l. petioled on the sheath, bifarious, elliptic-oblong, flat, midrib and few principal veins slender, venules very close, trabeculate with cross venules; panicle long-peduncled, stiff, erect, branches whorled, bearing short alternate branchlets; spikelets solitary, distant, 1-fld., articulate on very short pedicels; —male spikelets in the upper part of the panicle, minute, glumes 3, I and II broad, flat, unequal, membranous, glabrous, spreading from a very narrow base, upper largest, III cymbiform, pubescent, palea linear, 2-lobed, lobes narrow; lodicules 0; stam. 6, fil. very short, anth. linear, pistillode 0; —fem. spikelet, glumes I and II as in the male, III a pubescent rapidly accrescent utricle, with a terminal or lateral orifice from which the tip of the palea and the stigmas protrude, greatly enlarged in frt., palea linear, tip notched, accrescent and hardening in age; staminodes 6, very minute; ov. minute, gibbous, style slender, elongating with the growth of the glume, stigmas 3, exserted, spreading, penicillate; grain not seen.—Sp. 6; 2 in *Fl. B. Ind.*

Utricle erect, orifice terminal . . . . . 1. L. URCEOLATA.
Utricle decurved, orifice lateral . . . . . 2. L. COCHLEATA.

1. **L. urceolata,** *Br. in Benn. Pl. Jav. Rar.* 23 (1838).

Thw. Enum. 357. *L. zeylanica*, Nees ex Steud. Syn. Gram. 8. *Pharus urceolatus*, Roxb. Fl. Ind. iii. 611. C. P. 972.
Fl. B. Ind. vii. 95. Benn. l. c. t. 6.

Rootstock short, stout; stem 2–3 ft., simple or branched towards the base, leafy, about as thick as a goose-quill below, smooth, polished, nearly solid, internodes short, loosely sheathed, upper 2–4 in., lower rooting; l. 6–10 by $1\frac{1}{2}$–$2\frac{1}{2}$ in., from linear- or elliptic-oblong to obovate-oblong, acute or

acuminate, base acute or cuneate, thinly coriaceous, almost shining on both surfaces, margins quite smooth, petiole 2–3 in., slender, channelled above, sheaths as long as the internodes or longer, glabrous, lower equitant at the base, ligule a pubescent ridge; ped. 6–10 in., rigid and panicle puberulous with hooked hairs, branches 6–8 in a whorl, unequal, up to 6 in. long; glumes I and II caducous, oval, acuminate, II about $\frac{1}{7}$ in long, III of male spikelets erect, rather longer than the stamens, of fem. much larger, eventually $\frac{1}{4}$ in. long, inflated, turbinately pyriform, with a contracted base and short terminal neck on the truncate obscurely lobed top, densely tomentose with uncinate hairs.

Forests of the warmer parts of the Island; not very uncommon. Kakatudua Forests (Ferguson).

Malay Peninsula, Java, Sumatra.

2. **L. cochleata,** *Thw. Enum. Pl. Zeyl.* 357 (1864).
C. P. 896.
Fl. B. Ind. vii. 95.

Habit of *L. urceolata*, but more slender, stem creeping below; l. 4–6 by 1½–1¾ in., oblong or obovate-oblong, acute or acuminate, thin, shining beneath, base acute, margins quite smooth, petiole ¼–½ in., sheaths 1–3 in., lower not equitant; panicle 6–8 in., and ped. nearly glabrous, branches mostly ternately whorled in 6–8 superposed series, very slender, strict; male spikelets, glumes I and II ovate to orbicular, long-cuspidate, II much the largest, III cymbiform, acuminate, pubescent, palea slit nearly to the middle into 2 subulate lobes; fem. spikelets; glume III gibbously urceolate, pubescent, deflexed and incurved, mature $\frac{1}{4}$ in. long, inflated, shortly 5-ribbed or lobed, densely tomentose with uncinate hairs, orifice lateral; palea, style, and stigmas as in *L. urceolata*, but much smaller.

Forests of the Central Province, ascending to 4000 ft. (Thwaites), Matale (Gardner).

Endemic.

## *24. COIX, *L.*

Tall, leafy, monœcious grasses; stem branching, spongy within; l. long, flat; infl. of spiciform racemes terminating the branches, racemes of many male spikelets with one (rarely 2) fem. at the base, rhachis articulate at the base and above the fem. spikelet;—male spikelets 2–3-nate at each node of the rhachis, one sessile and one- or two-pedicelled, articulate at the base, but persistent, dorsally compressed;

* Name, Greek, of uncertain meaning and application.

glumes 4, I and II empty, I chartaceous, oval, narrowly winged along the inflexed margins, many-veined, II thinner, about 9-veined, III and IV membranous, hyaline, faintly 5-veined, triandrous or IV empty, paleate, paleas with broad flaps, faintly 2-keeled ; lodicules cuneiform, toothed ; anth. long, slender ;—fem. spikelet ovoid, entirely enclosed together with the base of the rhachis in an ovoid, eventually hardening closed bract ; glumes 4, I chartaceous, II–IV successively thinner, III and IV hyaline, paleate, fem. or III empty, paleas hyaline ; lodicules 0 ; ov. ovoid, styles 2, free, very long, capillary, stigmas exserted at the top at the bract, stigmatic hairs short ; grain orbicular, compressed, ventrally channelled, enclosed within the hardened stony bract.—Sp. few ; 1 in *Fl. B. Ind.*

**C. Lachryma-jobi,** *Linn. Sp. Pl.* 972. **Keekirrindee,** *S.*
Herm. Mus. 40, 29. Burm. Thes. 137, 138. Fl. Zeyl. n. 330. Moon, Cat. 62. Thw. Enum. 357 (*C. Lachryma*). C. P. 942.
Fl. B. Ind. vii. 100. Kunth, Enum. Pl. Suppl. t. 3, 4. Beauv. Agrost. t. 24, f. 5. Rheede, Hort. Mal. xii. t. 70.

Stem 3–5 ft. or more, stout, rooting at the nodes, internodes smooth, polished ; l. 4–18 by 1–2 in., narrowed from a broad cordate base to an acuminate tip, smooth on both surfaces, margins spinulosely serrate, midrib stout, veins many, very slender, sheaths long, smooth, ligule a very narrow membrane ; racemes 1–2½ in. long, nodding or drooping from very long peduncles, rhachis within the bract slender, above it stout, notched at the nodes ; male spikelets subsecund, imbricating, very variable in size, ½–¾ in. long ; glume I oblong, II, III, and IV oblong-lanceolate, acuminate ; anth. orange yellow ; fr. from broadly ovoid to globose, ¼–⅓ in. diam., pale bluish-grey, polished.

Hotter parts of the Island, naturalised and cultivated.

Cultivated in many hot countries, especially of Asia.

There are two species or forms of the genus *Coix* described by Roxburgh in his Flora Indica (iii. 568, 569), *C. Lachryma*, L., and *C. gigantea*, Kœn. Of these *C. Lachryma* is annual, with a stem 4-6 ft. high, and male spikelets in pairs; it inhabits rice grounds and ditches in Bengal. *C. gigantea* is a perennial, with a stem 8–15 ft. high and male spikelets in threes ; it grows chiefly in the valleys of the Circar Mts. and Bengal. Thwaites referred the Ceylon plant to *C. Lachryma*, and gives its habitat as common in cultivated ground. Ferguson (Gram. Indigenous to Ceylon, p. 2) says that *C. gigantea* is the species found in Ceylon and hitherto confounded with *C. Lachryma*, adding that Mr. Morris discovered that the latter is hardly indigenous in Ceylon. In his paper in the Journal of the Asiatic Society (Ceylon branch) Ferguson gives *C. gigantea* alone, with the native name of 'Maana,' adding that

it is common in waste land up to 5000 ft. In the Flora of British India, after an examination of a great number of specimens from all parts of the country, I have, supported by Dr. Stapf, treated *C. gigantea* as a variety of *Lachryma Jobi*, distinguished by its size, perennial root, and longer drooping racemes; and a review of the materials for this work confirms this view, the two forms passing into one another. Referring to the Ceylon material in Herb. Peraden. (C. P. 942) I find good specimens of a plant with ternate male spikes, but they do not afford means of telling whether they are of annual or perennial plants. In Herb. Kew. there is a specimen of true *C. Lachryma* with shorter racemes and binate male spikelets, from Col. Walker.

*Coix Lachryma Jobi* is cultivated by the hill tribes of some parts of India (apparently not in Ceylon) for its grain, the covering of which is much softer than in the indigenous form. Its nutritious value is low.

## 25. POLYTOCA, *Br.*

Tall, stout, erect, branching, leafy, perennial, monœcious grasses; stem spongy within; l. long, flat; infl. of spiciform racemes terminating the branches, at first enclosed in spathiform bracts; racemes all male, or with one or more fem. spikelets at the base, rhachis articulate at the base and above the fem. spikelets; male spikelets 2-fld., sometimes imperfect, solitary or binate, a sessile and pedicelled; glumes 4, with sometimes a terminal rudimentary imperfect, all subequal in length, I and II empty, I herbaceous, shallowly concave, strongly many-veined, and with a narrow membranous wing within the margin on each side, II much narrower, dorsally compressed, ovate, acuminate, chartaceous, rarely herbaceous, unequally 7–9-veined, III membranous, oblong, acuminate, 3–5-veined, paleate, triandrous, IV very slender, linear, delicately hyaline, vein central or 0, paleate, triandrous or empty, paleas as long as the glumes, of III broadly linear, hyaline, 2-keeled, of IV narrowly linear, flat, veins 2 or 0; lodicules 2, in both fl., cuneate; anth. long, linear, much largest in glume III;—fem. spikelet broadly oblong, dorsally compressed, 1-fld.; glume I thickly coriaceous, closely embracing the rhachis of the spike by its infolded margins, veins many, obscure, II, III, and IV enclosed in I, delicately membranous, hyaline, II quadrately oblong, many-veined, III narrower, oblong, 3–5-veined, paleate, empty, IV very narrow, truncate, 3-veined, paleate, flowering, paleas of III and IV very narrow, truncate, 2-veined, wrapped round the ov.; lodicules 0; styles very long, exserted from the top of glume I, stigmas capillary, minutely pubescent; grain enclosed in the thickened, nut-

like, polished, hardened glume, fusiform, terete. Sp. 6 or 8; 6 in *Fl. B. Ind.*

The above description applies especially to *P. barbata.* This genus and *Coix* are amongst the most complicate in the disposition and structure of the spikelets of any amongst grasses.

**P. barbata,** *Stapf in Fl. Brit. Ind.* vii. 102 (1896).
*Chionachne Kœnigii*, Thw. Enum. 357. *C. barbata*, Benn. Pl. Jav. Rar. 18; Trim. Cat. 106. *Coix barbata*, Roxb. Fl. Ind. iii. 569. *C. Kœnigii*, Spreng. Syst. i. 228. C. P. 3137.
Fl. B. Ind. l. c.

Stem 3–6 ft., as thick as the little finger below, terete, smooth, longer internodes up to 10 in., nodes narrowly softly bearded; l. up to 10 by $1\frac{1}{4}$ in., linear, acuminate, scabrid above, less so or smooth beneath, sometimes hirsute, midrib stout, veins many, slender, base narrow, margin scabrid, sheath long, smooth, glabrous or hairy, ligule tomentose; ped. of racemes 1–3 in. long, slender, fascicles of racemes panicled, spathiform sheaths 1 in. or more, tip awned, awn sometimes an in. long; proper spathes $\frac{1}{2}$ in., oblong, awned; male portion of raceme appearing as if sessile on the top of the fem. spikelet, articulate with the internode below it, which is embraced by the margins of the outer glume of the fem. spikelet, rhachis hardly articulate between the male spikelets, which are $\frac{1}{4}$–$\frac{1}{3}$ in. long; glume I of male spikelet oblong or lanceolate, obtuse acute or apiculate, glabrous or hairy, veins more or less trabeculate; glume I of fem. spikelet intruded at the base to receive the clavate end of the lower internode of the rhachis of the spike, quadrately oblong, sides rounded, lateral veins of glumes II and III arching at their tips to meet the mid vein.

Central and Southern Provinces; not uncommon. Fl. Dec., Jan. Throughout India, Java.

### 26. **DIMERIA,** *Br.*

Erect, annual or perennial grasses; infl. of solitary, binate, or digitate, slender spikes, bearing many secund bifarious solitary spikelets, rhachis terete, angular, or flattened, inarticulate; spikelets sessile, articulate on very short pedicels, laterally strongly compressed, 1-fld., bisexual, callus short or long, bearded; glumes 4, I and II usually divaricate in flower, empty, I coriaceous, linear, sides complicate, dorsally rounded, II as long as I or longer, chartaceous, empty, oblong, margins hyaline, sides complicate, dorsally keeled, keel sometimes winged, III much shorter, linear or oblanceolate, empty,

hyaline, ciliate, epaleate, IV hyaline, complicate, oblong, bifid, awned in the sinus, awn capillary, column short, palea minute or 0; lodicules 0 or most minute; stam. 2, anth. long or short; styles short, stigmas short, laterally exserted; grain linear, compressed.—Sp. 18; 12 in *Fl. B. Ind.*

The fine specimens of this genus in the Peradeniya Herbarium have enabled me to improve the description of the Ceylon species given in Fl. B. Ind., and make some important corrections. Nevertheless, much more ample material is required before the species can be regarded as satisfactorily established, for the characters taken from the rhachis of the spikes and the glumes are liable to considerable variation. I am not satisfied that the division of the species into annual and perennial is sound, being derived from dried specimens only. It might be better to divide them primarily by the number of spikes, as follows:—

Spikes invariably solitary:—*D. pusilla*, *D. Thwaitesii.*

Spikes 2–3, very rarely solitary:—*D. pubescens*, *D. Lehmanni*, *D. fuscescens*, *D. Trimeni.*

Spikes many:—*D. gracilis.*

Lastly, as regards the distribution of the species in Ceylon, I have little or no information, the Herbarium specimens being from isolated or very few localities, and these not always to be found in any accessible map of the island.

Annuals.<br>
  Keel of glume II winged.<br>
    Glume II acuminate or awned.<br>
      Glume II awned . . . . 1. D. PUSILLA.<br>
      Glume II not awned . . . 2. D. PUBESCENS.<br>
    Glume II obtuse.<br>
      Glume IV awned . . . 3. D. LEHMANNI.<br>
      Glume IV not awned . . . D. LEHMANNI, var. MUTICA.<br>
  Keel of glume II not winged . . 4. D. THWAITESII.<br>
Perennials.<br>
  Spikes 2 or 3.<br>
    Rhachis of spike filiform, glabrous 5. D. FUSCESCENS.<br>
    Rhachis of spike flattened, ciliate . 6. D. TRIMENI.<br>
  Spikes 3–many . . . . . . 7. D. GRACILIS.

1. **D. pusilla,** *Thw. Enum.* 369 (1864).
*Hack. Monogr. Androp.* 78. C. P. 957.
Fl. B. Ind. vii. 103 (excl. var. *pallida*).

Annual; stems tufted, 6–18 in. high, very slender, leafy, simple or branched; l. 1–3 by $\frac{1}{10}$–$\frac{1}{8}$ in., linear, acuminate, quite smooth, glabrous, midrib slender, sheath smooth, auricles ciliolate, ligule very short, truncate; spike solitary, $1\frac{1}{2}$–2 in. long, rhachis filiform, trigonous, internodes very short, margins smooth or scaberulous; spikelets $\frac{1}{5}$ in. without the awns, sessile or very shortly pedicelled, callus as long as the pedicel, thickly bearded; glumes I and II sparsely or copiously hirsute, I linear, acuminate, keel scabrid and ciliate, II rather longer, narrowly oblong, acuminate, margins ciliate,

awn as long as the glume or shorter, erect, scaberulous, wing of keel as broad as the glume or narrower, scaberulous, III narrowly oblong, ciliate towards the obtuse tip, veinless, IV narrowly oblong, tip obtusely bifid, awn $\frac{1}{3}$–$\frac{2}{3}$ in., palea and lodicules 0 or obscure; anth. $\frac{1}{30}$ in.

Var. 1 **pusilla** proper, Fl. B. Ind. l. c. D. pusilla, *Thw.* l. c.

Stem 6–8 in., simple, spikes 1–1½ in., glumes I and II sparsely hairy.

Var. 2 **elatior,** Fl. B. Ind. l. c.

Stem taller, stouter, branching upwards, spikes 1½–2 in., glumes I and II copiously silkily ciliate, wing of glume II narrower.

Trincomalie (Glenie). Var. *elatior*, Kokoladoa (*Gardner*).

2. **D. pubescens,** *Hack. Monogr. Androp.* 83 (1889).
*D. ornithopoda*, var. γ, Thw. Enum. 369, excl. syn. *fuscescens*. C. P. 956.
Fl. B. Ind. vii. 105.

Annual; stems tufted, erect or ascending, leafy at the base chiefly, upper internodes very slender, often decurved, lower nodes bearded; l. erect, crowded at the base of the stem, 3–5 by $\frac{1}{6}$–$\frac{1}{3}$ in., narrowly linear, oblanceolate, finely acuminate, rigid, more or less softly covered with long tubercle-based hairs on both surfaces, base very narrow, margins scaberulous, midrib rather broad, pale, sheaths shortly auricled, glabrous or hairy, lower short, compressed, margins membranous, ligule rounded, eciliate; spikes 1 or 2, erect or divaricate, 2–3 in. long, pale brown, rhachis flat, $\frac{1}{20}$–$\frac{1}{10}$ in. broad, margins rigidly ciliate, internodes very short; spikelets $\frac{1}{5}$ in. long, sessile or subsessile, callus very short, shortly bearded; glumes I and II acuminate, more or less silkily ciliate, I as long as II, II lanceolate, keeled, keel nearly as broad as the rest of the glume, ciliate with long hairs, margins softly ciliate, III narrowly lanceolate, ciliate, 1-veined, IV oblong, tip bifid, awn $\frac{1}{4}$ in., palea and lodicules 0 or obscure; anth. $\frac{1}{15}$ in., linear; grain $\frac{1}{10}$ in. long, narrowly fusiform, flattened.

Central Province, Passilova, Pasdun Korale, Hantane, Ramboda, &c. Endemic.
Nearly allied to *D. Trimeni.*

3. **D. Lehmanni,** *Hack. Monogr. Androp.* 82 (1889).
*D. ornithopoda*, Thw. Enum. 369, excl. vars. β, γ, et syn. *D. gracilis*. *Pterigostachyum Lehmanni*, Nees; Steud. Syn. Gram. 413. C. P. 952, 3321.
Fl. B. Ind. vii. 104.

Annual; stems tufted, 1–2 ft., slender, simple or branched,

leafy chiefly at the base, upper internodes very long, filiform, nodes glabrous or bearded; l. mostly thickly crowded at the base of the stem, 2–6 by $\frac{1}{12}$–$\frac{1}{6}$ in., erect, narrowly linear, finely acuminate, narrowed from above the middle to the base, glabrous or pubescent with long spreading hairs, margins smooth or scaberulous, midrib slender, white shining, sheaths terete, glabrous or hairy, mouth not auricled, ligule short, truncate, spikes 2–3, slender, strict, rhachis slender, flattened, margins ciliate, internodes very short; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in., very shortly pedicelled, pedicel flat, callus minute, shortly bearded; glume I shorter than II, subacute, dorsally ciliate with long hairs, II linear-oblong, tip rounded, margins and wing of keel ciliate with long hairs, III narrowly oblanceolate, IV oblong, tip bifid, awn $\frac{1}{4}$ in., palea and lodicules 0; anth. linear $\frac{1}{20}$ in.

**D. Lehmanni proper,** var. *α*, *aristata*, Hack. Monogr. Androp. 83.

Rhachis of spike ciliate, glume II narrowly winged, ciliate with long hairs as is the keel of I. C. P. 952, 3321.

*β*, **mutica,** *Hack. l. c.*

Rhachis of spike eciliate, glume II broadly winged, shortly ciliate, keel of glume I scaberulous. *D. ornithopoda* and *D. mutica*, Thw. l. c. *D. alata*, Hk. f., Fl. B. Ind. l. c. C. P. 955.

Throughout the Island; not uncommon up to 7000 ft. Var. *β*. Suffragam and Colombo.

4. **D. Thwaitesii,** *Hack. Monogr. Androp.* 78 (1889).
*D. pusilla*, var. *pallida*, Thw. MSS. C. P. 3965.
Fl. B. Ind. vii. 103.

Annual; stems, tufted, 6–8 in. high, subsimple, leafy; l. 1–2 by $\frac{1}{12}$–$\frac{1}{10}$ in., narrowly linear-lanceolate, acuminate, glabrous, or ciliate towards the base, midrib very slender, sheaths glabrous, mouth hardly auricled, ligule broadly ovate or rounded, ciliolate; spike solitary, $\frac{1}{2}$–$1\frac{1}{4}$ in. long, rhachis very slender, flattened, internodes short, margins ciliate; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in., sessile or very shortly pedicelled, callus very shortly bearded, glumes I and II sparsely hairy, both aristately acuminate, II $\frac{1}{4}$ longer than I, lanceolate, margins ciliate, keel rounded ciliate with long hairs, not winged, III much shorter, linear, but dilated upwards, ciliate, IV narrowly oblong-ovate, tip obtusely bifid, awn $\frac{1}{3}$ in., palea 0; lodicules obscure; anth. minute, oblong; grain $\frac{1}{15}$ in., linear, flattened, base acuminate.

Central Province. Dambulla (Thwaites).

Endemic.

Closely resembles *D. pusilla*, Thw., and is the only other Ceylon species with filiform stems. Hackel describes the stems as ascending and branching, the spikelets as all pedicellate, and the awn of glume IV as longer than I find it to be in the Peraden. Herb. specimens.

5. **D. fuscescens,** *Trin. in Mem. Acad. Petersb.* Ser. VI. ii. 335 (1833).

Trim. Cat. Ceyl. Pl. 107. *D. fuscescens*, *β zeylanica*, Hack. Monogr. Androp. 85. *D. ornithopoda*, var. *β*, Thw. Enum. 369. C. P. 3256.

Fl. B. Ind. vi. 105.

Perennial; stems 12–18 in., slender or stout, densely tufted, erect, leafy chiefly at the base, internodes few, upper very slender, nodes glabrous; l. crowded towards the base of the stem, 2–3 by $\frac{1}{8}$–$\frac{1}{6}$ in., strict, erect, narrowly oblanceolate, finely acuminate, rigid, glabrous or hairy towards base, margins scaberulous, midrib slender, sheaths short, glabrous, terete or lower compressed, mouth not auricled, ligule broad, short, ciliolate; spikes 2–3-nate, 2–3 in. long, strict, divergent, lax-fld., glabrous, dark purplish, rhachis slender, rigid, unequally trigonous, smooth, internodes half as long as the spikelets or longer; spikelets shortly pedicelled, $\frac{1}{5}$–$\frac{3}{10}$ in. long, callus minute, shortly bearded, pedicels clavate, glumes I and II subequal, rigid, scaberulous, cuspidately acuminate, keels of I scaberulous, II narrowly oblong, wing as broad as the glume, scaberulous, margins membranous, obscurely ciliate, III obovate-lanceolate, 1-veined, tip rounded, ciliate, IV narrowly oblong, tip bifid, awn about $\frac{1}{3}$ in., palea minute, lanceolate, ciliate; lodicules very minute, cuneate; anth. $\frac{1}{10}$ in.

Var. *β*, **robusta,** *Hook. f.*

Stem taller, much stouter, branching and leafy upwards.

Central Province. Horton Plains, and Nuwara Eliya, alt. 6000–7000 ft. Var. *β*, Knuckles (Ferguson).

Nepal, the Khasia Hills, Tenasserim, and the Concan.

According to Hackel, the type of *D. fuscescens* is Wallich's n. 8841, in which the spikelets are dense-fld., the rhachis of the spike scabrous or scaberulous, and the keel of glume II not winged, but with a short scarious ciliate margin below the tip. The Ceylon plant he regards as a variety, *β zeylanica*, with longer spikelets and the keel of glume II rather broadly winged. Of this last he cites no specimen or number of Thwaites, but gives as a habitat Dambulla, Trimen, of which there are no specimens in Herb. Peraden.

6. **D. Trimeni,** *Hook. f.*

*D. ornithopoda*, var. *γ*, Trim. MSS.

Perennial; stems tufted, erect or ascending from a creeping rootstock, 1$\frac{1}{2}$–2 ft. high, rather stout below, branched, leafy, upper internodes slender, nodes bearded; l. 6–8 by $\frac{1}{8}$–$\frac{1}{6}$ in., linear or very narrowly oblanceolate, rigid, narrowed from much above the middle to the acuminate tip and very narrow base, rigid, more or less villously hairy or woolly on both surfaces, margins scaberulous, midrib stout, sheaths woolly, mouth not auricled, ligule broadly rounded, ciliolate;

spikes 1 or 2, 3–4 in. long, more or less curved, nut-brown, rhachis flat, $\frac{1}{15}$ to nearly $\frac{1}{10}$ in. broad, margins softly ciliate, internodes very short; spikelets sessile, $\frac{1}{6}$ in. long, callus minute, bearded; glumes I and II subequal, acuminate, villously hairy more or less all over, II oblong-lanceolate, keel with a minute scaberulous wing close under the tip, III narrowly spathulate, ciliate above the middle, IV oblong, obtusely bifid, awn $\frac{1}{2}$ in. long; palea and lodicules obscure or 0; anth. $\frac{1}{18}$ in., narrowly linear.

Hab. ? (Trimen), Elpiliya Patana (Pearson).
Endemic.

I find in the Peradeniya Herbarium an unnumbered sheet with three specimens of this plant without habitat, marked *D. ornithopoda*, var. γ, by Dr. Trimen. It resembles what would be a very large stout perennial state of *D. pubescens* with longer narrower woolly leaves and sheaths, but differs from that plant in the smaller spikelets, glume II of which has no other wing to the keel than a minute dilatation close under the tip.

7. **D. gracilis,** *Nees ex Steud. Syn. Gram.* 413 (1854).
*D. gracilis* and *leptorhachis*, Hack. Monogr. Androp. 88, 89. Fl. B. Ind. vii. 105. *D. pilosissima*, Thw. Enum. 369, non Trim. *D. laxiuscula*, Thw. ex Trim. in Journ. Bot. xxiii. (1885), 272. C. P. 24, 3261, 3863.
Fl. B. Ind. l. c.

Perennial; stems densely tufted, 2–3 ft. high, stout, erect, sometimes as thick as a small goose-quill below, leafy almost up to the spikes, rarely branched, nodes silky or glabrous; l. 6–10 by $\frac{1}{8}$–$\frac{1}{6}$ in., erect, rigid, narrowly linear, finely acuminate, somewhat broader about the middle, base narrowed into the sheath, glabrous or pilose, margins smooth, veins slender, sheaths terete, mouth not auricled, ligule short, broad, membranous ciliolate; spikes 3–10, 3–5 in. long, very slender, flexuous, pale brown, lax-fld., rhachis filiform, obtusely trigonous or subterete, glabrous, smooth, internodes $\frac{1}{6}$–$\frac{1}{3}$ in.; spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., pedicels long or short, terete, smooth, lower sometimes half as long as the spikelet, callus very short, densely bearded; glumes I and II subequal or II longest, acuminate or aristulate, glabrous or villous with long hairs, I more or less scaberulous, II linear, membranous and glistening for half its breadth, hyaline margins ciliate, keel rounded, smooth or minutely scaberulous, wing 0, III obvate-oblong, ciliate above the middle, vein 1 or 0, IV oblong, acutely bifid, awn $\frac{1}{3}$–$\frac{2}{3}$ in., palea very minute, narrow, ciliate; lodicules large, broadly cuneate; anth. $\frac{1}{12}$–$\frac{1}{6}$ in.

Southern and Central Provinces. Adam's Peak (Gardner), Gibson's Hill, Galle, and Pasdun Korale (Thwaites), Labugama and Caltura (Trimen).

I am unable to distinguish *D. leptorhachis*, Hack., from *D. gracilis* by any character. The main difference, according to Hackel, is that the

leaves of *leptorhachis* are contracted at the sheath and the stems waxy below the nodes, whereas in *D. gracilis* the leaves pass insensibly into the sheath and the stems are not waxy. I see no difference in the leaf-bases, and I do not find the wax in either. The name *gracilis* is not appropriate.

### 27. IMPERATA, *Cyrill.*

Erect, perennial grasses; stem leafy, internodes solid; l. narrow; infl. a silvery-silky subcylindric panicle, with very short filiform branches and spikes, rhachis of branches and spikes not articulate; spikelets all alike and bisexual, narrow, terete, immersed in very long hairs from the small callus and outer glumes, binate, a sessile and pedicelled, articulate at the base, fugacious, 1-fld.; glumes 4, I and II subequal, membranous, dorsally rounded or II obscurely keeled, 3–5-veined at the base, I ovate-lanceolate, tip hyaline, obtuse, II acuminate, III and IV very short, erose, palea minute; lodicules 0; stam. 1 or 2; styles connate below, stigmas very long, narrow, exserted at the top of the spikelets; grain oblong.—Sp. 5; 1 in *Fl. B. Ind.*

**I. arundinacea,** *Cyrill. Pl. Rar. Neap.* fasc. ii. 27 (1792). **Iluk,** *S.*
Thw. Enum. 369. Moon, Cat. 7 (*Saccharum*). C. P. 968.
Fl. B. Ind. vii. 106. Cyrill. l. c. t. 11. Reichb. Ic. Fl. Germ. t. 55.

Rootstock stoloniferous, often creeping; stem 6 in.–3 ft., stout or slender, smooth, glabrous, nodes naked or bearded; l. 6–18 by $\frac{1}{12}$–$\frac{1}{3}$ in., flat, tapering from the middle to a finely acuminate tip, and to a very narrow often ciliate base, smooth above, beneath and margins scaberulous, sheaths loose, glabrous or margins ciliate, mouth not auricled, bearded, ligule of long soft hairs; panicle 3–8 in., silvery white, with dark purple anthers and stigmas, internodes of spikes short, tips dilated; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in., lanceolate, hairs of callus and glumes twice as long as the spikelet; glume I pale green or yellowish, veins not reaching the tip, II with very long hairs dorsally, III and IV hyaline, veinless, erose, and ciliolate, III oblong, about half as long as I, IV still shorter, quadrate, palea variable.

Common in the hotter parts of the Island. Panicle silvery white.

All warm countries.

A pest in ground that has gone out of cultivation. The leaves make an excellent thatch. I have described the glumes as I find them in Ceylon specimens, but the inner especially vary greatly in those from other countries.

### 28. SACCHARUM, *L.*

Tall, perennial grasses; l. narrow, flat; infl. and large silky much and densely branched panicle with spreading or erect

filiform branches and branchlets (spikes), branches and spikes articulate, usually fragile; spikelets 1-fld., all alike, bisexual, not awned, articulate at the base, a sessile and pedicelled, the sessile deciduous with the internode and pedicel, callus bearded with very long hairs; glumes 4, I and II subequal, membranous or subcoriaceous, I oblong or lanceolate, dorsally flat or convex, margins incurved or inflexed, 1–2-veined at each flexure, keels not winged or scaberulous, II concave, dorsally rounded or obscurely keeled, III hyaline, oblong, IV various or o, awn o, palea minute or o; lodicules cuneate or irregularly formed; stam. 3; styles and stigmas short, laterally exserted; grain oblong or subglobose.—Sp. 14; 5 in *Fl. B. Ind.*

Glume I subulate-lanceolate, dorsally flat . . 1. S. SPONTANEUM.
Glume I oblong, dorsally convex . . . 2. S. ARUNDINACEUM.

1. **S. spontaneum,** *Linn. Mant.* ii. 183 (1771).
Thw. Enum. 369. Moon, Cat. 7. C. P. 3681.
Fl. B. Ind. vii. 118. Trin. Fund. Agrost. t. 15, f. 1–6.

Stem 4–8 ft., erect from a stout rootstock, as thick as a swan's quill below, solid, smooth, polished, leafy, silky beneath the panicle; l. $1\frac{1}{2}$–$2\frac{1}{2}$ ft., rarely more than $\frac{1}{6}$ in. broad, erect, narrowly linear, acuminate, narrowed downwards into the stout midrib, rigid, coriaceous, glabrous, smooth, or scaberulous above and on the often involute margins, tips capillary, sheaths smooth, mouth fimbriate, auricled, ligule ovate, membranous; panicle 1–2 ft., lanceolate, rhachis slender, smooth, glabrous below, silky upwards, branches or spikes 3–5-nate, 2–4 in., simple or divided; rhachis almost capillary, fragile, sparsely silvery silky with very long hairs, internodes longer or shorter than the spikelets; spikelets $\frac{1}{8}$–$\frac{1}{7}$ in., callus minute, bearded with spreading silky hairs $\frac{1}{2}$ in. long; glume I subulate-lanceolate, acuminate, gibbous and coriaceous at the base, hyaline above it, margins smooth, incurved with a vein in the flexure, II rather shorter, oblong-ovate, acuminate, keeled, base opaque, 1-veined, keel and margins ciliate, III ovate-lanceolate, acuminate, ciliate, veins o, IV very slender, ciliate, palea very minute, ciliate; lodicules cuneate or quadrate, toothed or lunate, with often a single long hair at one angle; anth. linear.

Hotter parts of the Island; common. Panicle silvery.
Warm regions of Asia and Australia.
Referred by Hackel (Monogr. Androp. 114) to sub-species *genuinum*, the common Asiatic form distinguished from the African by its more

slender habit, narrower leaves, shorter spikelets, and shorter hairs on the callus.

Commonly used for fencing about Colombo (Ferguson).

2. **S. arundinaceum,** *Retz. Obs.* iv. 14 (1786). **Rambuk,** *S.* **Pey-karumu,** *T.*

*S. procerum*, Roxb.; Trim. Cat. Ceyl. Pl. 106. C. P. 3939.
Fl. B. Ind. vii. 119. Rheede, Hort. Mal. xii. t. 46.

Stem 6–20 ft., erect from a stout rootstock, $\frac{1}{3}$ in. diam., spongy within, internodes 6–12 in., terete, smooth, uppermost glabrous under the panicle; l. 3–5 ft. by 1–2 in. below the middle, tapering thence upwards to a long filiform point, and slightly downwards to the base, coriaceous, smooth on both surfaces, glaucous beneath, margins spinulose, midrib up to $\frac{1}{4}$ in. broad, shining, veins many, very slender, sheaths terete, coriaceous, mouth not auricled, sides bearded, ligule short, lunate, hairy; panicle 1–2 ft., dense-fld., ovoid or oblong, erect, decompound, rhachis stout, glabrous, branches half whorled, spreading in fl. ascending in fr., filiform; spikes 1–3 in., rhachis filiform, fragile, internodes $\frac{1}{5}$–$\frac{1}{4}$ in., villous, tips obconic; spikelets $\frac{1}{10}$ in., clothed with long, soft, creamy or purplish woolly hairs up to $\frac{1}{4}$ in. long, callus very short; glume I oblong-ovate, acuminate, dorsally convex, margins incurved, 1-veined in the flexures, II lanceolate, acuminate, 1–3-veined, margins above the middle and keel ciliate with long hairs, III oblong, hyaline, obtuse, 1-veined, margin above shortly ciliate, IV smaller, lanceolate, subaristately acuminate, margins ciliate above, palea quadrate, ciliate; lodicules irregular in shape; anth. $\frac{1}{20}$ in.

Abundant up to 2000 ft. (Ferguson). Panicle pale brown or purplish.
The Gangetic Plain and Southern China.
One of the elephant grasses of Ceylon.

SACCHARUM OFFICINARUM, *L.*, the sugar cane, is cultivated in Ceylon. There is a flowering specimen of it in Herb. Peradeniya from the Bridge of Boats, Colombo (Ferguson).

## 29. POLLINIA, *Trin.*

Annual or perennial grasses; infl. of solitary or binate, shortly racemed or fascicled, more or less hirsute or silky spikes, rhachis of spike articulate, more or less fragile, internodes and pedicels of upper spikelets usually slender; spikelets 1-2-fld., binate, a sessile and pedicelled, those of each pair similar in form and sex or nearly so, callus short, bearded; glumes 4, I and II subequal, chartaceous or coriaceous, I dorsally flat or concave, rarely convex, margins incurved or inflexed, 2-keeled or winged above, II as long as I, ovate-lanceolate, acuminate,

keeled, 1–3-veined, III hyaline, paleate or not, IV hyaline, 2-cleft, awned in the sinus, awn slender, column brown, palea very short; anth. 2 or 3, linear; styles short, stigmas long, very narrow; grain oblong.—Sp. about 32; 23 in *Fl. B. Ind.*

The above diagnosis embraces the Ceylon species. The genus is closely allied to *Ischæmum*, which is described as differing in the dissimilarity of the sessile from the pedicelled spikelets, a character that does not hold good in some Ceylon species. In so far as these are concerned, *Pollinia* may be better distinguished by its slender internodes of the spikes and pedicels, and the, when present, minute broad truncate ciliate palea of glume IV. The subgenus *Amphilophis* of *Andropogon* may easily be mistaken for *Pollinia*.

Leaf-base not conspicuously contracted.
  Basal sheaths of stem naked.
    Spikelets $\frac{1}{6}$–$\frac{1}{4}$ in. . . . . . . . 1. P. THWAITESII.
    Spikelets $\frac{1}{10}$ in. . . . . . . . . 2. P. ARGENTEA.
  Basal sheaths of stem tomentose . . . . . 3. P. PHÆOTHRIX.
Leaf-base conspicuously contracted . . . . . 4. P. CILIATA.

1. **P. Thwaitesii,** *Hack. Monogr. Androp.* 163 (1889).
*P. tristachyæ*, Thw. *forma*, Thw. Enum. 368. *P. tristachya*, var. *distachya*, Trim. Cat. Ceyl. Pl. 106. C. P. 949.
Fl. B. Ind. vii. 111.

Perennial; stems 12–14 in., densely tufted, stout, erect, rigid, glabrous except below the infl., internodes few, nodes glabrous; l. mostly radical with a few cauline, radical l. very many, crowded, 4–6 in. long, erect, filiform, wiry, $\frac{1}{20}$ in. diam. from the sides being involute to the strong pale midrib, gradually acuminate, striate, quite glabrous, passing gradually into the sheaths, which are 1–2 in. long, coriaceous, open, dilating downwards, the base only equitant, mouth not auricled, margins bearded with a tuft of long erect silky hairs, ligule a short membrane; cauline l. very narrow, flat above the sheath, uppermost with usually spathiform narrow erect compressed sheaths 3–4 in. long, tipped by a subulate limb; spikes 2–3, 1–3 in. long by $\frac{1}{2}$ in. across the spikelets, rhachis filiform, fragile, plano-convex, and pedicels densely silkily villous, internodes half as long as the spikelets; sessile spikelets $\frac{1}{3}$ in., callus short, bearded, glume I chartaceous, oblanceolate-oblong, dorsally flat or somewhat depressed, softly hairy, tip truncate, erose, margins narrowly incurved, densely silkily ciliate, 2-veined at the flexures, II oblanceolate, acuminate, 1-veined, chartaceous, dorsally rounded, margins involute, more or less ciliate towards the tip, III like II but smaller, membranous, veins 0, IV shorter, oblong, bifid, scarious, lobes ciliolate, awn about $\frac{4}{10}$ in., column short, palea very short, quadrate, erose, ciliate; lodicules minute, cuneate;

anth. large, linear, stigmas very long and narrow; pedicelled spikelets narrower than the sessile, bisexual.

Central Province, in swamps alt. 7000 ft. Nuwara Eliya (Gardner). Endemic.

2. **P. argentea,** *Trin. in Bull. Sc. Acad. Petersb.* i. 71 (1836).
*P. tristachya*, Thw. Enum. 368 (excl. *forma*). C. P. 995.
Fl. B. Ind. vii. 111.

Perennial; stems densely tufted, $1\frac{1}{2}$–4 ft., stout or slender, erect, simple or branched, smooth, shining, leafy at the base and upwards, nodes glabrous; l. 6–18 by $\frac{1}{20}$–$\frac{1}{6}$ in., erect, very narrowly linear, rigid, often filiform, tips capillary, base not contracted, glabrous, striate, flat or margins involute, sheaths long, slender, coriaceous, mouth not auricled, sides bearded with long hairs, ligule a short membrane fringed with long hairs; spikes 2–12, 1–6 in. long, narrow, lax-fld., rhachis firm, filiform, flexuous, compressed, sides of pedicels silkily villous, internodes shorter than the pale brown spikelets; sessile spikelets $\frac{1}{8}$ or $\frac{1}{7}$ in., callus minute; glume I linear-oblong, dorsally flat, hairy, crustaceous below, membranous above, tip contracted, hyaline, truncate, margins narrowly incurved, villous with long erect silky hairs, II broadly oblong, 1-veined, margins incurved, ciliate, tip erose, III narrowly oblong, hyaline, flat, veinless, ciliate, IV much shorter than II, linear-oblong, cleft into two subulate lobes, awn about $\frac{1}{2}$ in., capillary, palea 0; lodicules minute, cuneate; anth. $\frac{1}{10}$ in.; pedicelled spikelets like the sessile, but narrower.

Central and Uva Provinces, ascending to 7000 ft., Haputale, Nilgule, Ambagamuwa, Ramboda.

Hilly districts of India, Malaya, and Australia.

3. **P. phæothrix,** *Hack. Monogr. Androp.* 168 (1889).
*P. Cumingii*, Thw. Enum. 368, non Nees. C. P. 959.
Fl. B. Ind. vii. 112.

Perennial; stems 1–3 ft., slender, erect, strict, simple, leafy upwards, pale reddish-brown, pubescent under the infl. only, nodes glabrous, base thickly clothed with dark red-brown tomentum; l. 6–12 in., either chiefly short and subradical with few cauline, or cauline very long, filiform, glabrous or more or less woolly, rigid, wiry, flat or sides involute, sheaths of short radical l. short, woolly, of longer and cauline elongate, slender, uppermost sometimes forming a compressed narrowly lanceolate green spathe to the infl. 3–4 in. long, outer basal sheaths more or less thickly clothed with red-brown wool, mouth not auricled, sides villous, ligule short, membranous, ciliolate; spikes 2–4, 1–5 in. long, by $\frac{1}{4}$ in. across the spikelets, flexuous, rhachis very slender, com-

pressed, plano-convex, fragile, margins of pedicels villous with long yellow-brown, rarely silvery, soft hairs; sessile spikelets $\frac{1}{6}$–$\frac{1}{5}$ in., linear-oblong, callus very small, bearded, glumes I and II villous like the rhachis with long soft erect hairs, I linear-oblong, chartaceous, top narrowed minutely truncate, margins narrowly incurved, II ovate-oblong, 1-veined, tip erose, margins villously ciliate above the middle, keel dorsally ciliate about the middle, III as long as II, obovate-oblong, obtuse, veinless, villously ciliate, IV much shorter, deeply bifid, lobes acute, ciliate, awn $\frac{1}{3}$–$\frac{1}{2}$ in., palea very small, broad, truncate, ciliate; anth. $\frac{1}{12}$ in.; pedicelled spikelet smaller and narrower than the sessile.

Central and Uva Provinces. Nuwara Eliya, Dambulla, Atampitiya.
Nilgiri Hills.

The curious dark-red brown tomentum at the base of the stems sometimes extends for an inch or more up the lowest l.-sheaths; at others it is present only on the base of the stem below the sheaths; in the latter case it occurs sometimes in pisiform masses.

4. **P. ciliata,** *Trin. in Mem. Acad. Petersb.* Ser. VI. ii. 306 (1833).
*P. Wallichiana*, Nees; Thw. Enum. 369. C. P. 950.
Fl. B. Ind. vii. 116.

Stem 2–4 ft., slender, naked below, much branched, branches straggling, remotely leafy, internodes 4–6 in. or uppermost much longer, nodes glabrous, often rooting; l. 4–6 by $\frac{1}{6}$–$\frac{1}{2}$ in., spreading, linear-lanceolate, acuminate, thin, flat, narrowed downwards to an acuminate or sub-petioled base, glabrous, margins scabrid, midrib slender, veins 3–4 pairs, sheaths terete, glabrous, mouth not auricled, glabrous, ligule ovate, eciliate; spikes 5–10, fascicled, very slender, 2–5 in. long, fragile, pale green, internodes shorter or longer than the spikelets and pedicels, clavate, compressed, plano-convex, ciliate in one or both margins; sessile spikelets $\frac{1}{8}$ in., callus minute, bearded; glume I thinly chartaceous, scaberulous, linear, acute, 3–5 veined, dorsally flat, margins incurved spinulosely ciliate towards the tip, II linear-oblong, acute acuminate or aristulate, 1–3 veined, margins above hyaline ciliate, keel scabrid, awn capillary, sometimes as long as the glume, III hyaline, narrowly oblanceolate, 1-veined, IV minute, orbicular, entire or 2-lobed, awn $\frac{1}{3}$–$\frac{2}{3}$ in., palea minute, ovate, obtuse; anth. $\frac{1}{12}$ in.; pedicelled spikelet smaller than the sessile, bisexual, glume III 0.

Central and Sabaragamuwa Provinces, not uncommon. Kandy, Matale, Hantane, Kaduganawa.
Hilly country of India.

Hackel refers Thwaites's plant to subsp. *laxa*, characterised by the cilia of the joints of the spike being 3–4 times longer than the joint itself,

by linear-lanceolate glume I with a 2-mucronulate tip, by glume II being aristulate, and IV entire. I find, however, that glume I is usually simply acute, II often not aristulate, and IV bilobed in both the sessile and pedicelled spikelets. He has further a subsp. *seminuda* from Ceylon, Thwaites (C. P. 411, ex parte), which I do not find in the Peradeniya Herbarium, where C. P. 411 is all *Andropogon pertusus*. The characters of subsp. *seminudus* are to have the joints of the spike with cilia 4–6 times longer than the joint itself on one side only, glume I bimucronulate, callus nearly glabrous, awn of glume II as long as the glume or one-third shorter, and glume IV entire. As far as the Ceylon form of *P. ciliata* is concerned, I do not think that the above characters constitute even well-marked varieties.

### 30. **ROTTBOELLIA**, *Linn. f.*

Annual or perennial grasses of various habit; stems leafy; l. narrow, flat; spikes solitary, racemose or subpanicled, rhachis articulate, internodes terete or compressed, each bearing a pair of dissimilar awnless spikelets, a lower 1–2-fld., usually bisexual, sessile, sunk in a cavity of the internode, the upper pedicelled, male or neuter, with the pedicel free or adnate to the side of the internode; sessile spikelet as long as or shorter than the internode; glumes 4, I coriaceous, ovate or oblong, flat or convex, closing the mouth of the cavity, margins narrowly incurved, II very thin, 1–3-veined, III hyaline, paleate or not, neuter, IV hyaline, paleate, bisexual; lodicules quadrate or cuneate; anth. 3, linear; styles rather distant at the base and stigmas short; upper or pedicelled spikelet smaller than the sessile; glume I usually herbaceous, II–IV much as in the male spikelets; grain oblong, compressed.—Sp. about 30; 18 in *Fl. B. Ind.*

In the above description *R. perforata* is not included. After further examination of it I think that the genus *Mnesithea*, Kunth, should be maintained.

Rhachis of spike not fragile . . . . . . 1. R. COMPRESSA.
Rhachis of spike fragile.
  Leaf-base narrow, rounded . . . . . . 2. R. EXALTATA.
  Leaf-base broad, cordate . . . . . . 3. R. NIGRESCENS.

1. **R. compressa**, *Linn. f. Suppl.* 114 (1781).

Moon, Cat. 9. *Hemarthria compressa*, Kunth; Thw. Enum. 364. C. P. 3254.

Fl. B. Ind. vii. 153 (var. *genuina*). Roxb. Cor. Pl. ii. t. 156 (*R. glabra*).

Stem 2–5 ft., decumbent and rooting below, branched, slender or stout, compressed, ribbed, glabrous, leafy; l. 1–5 by $\frac{1}{8}$–$\frac{1}{5}$ in., linear, acuminate, flat, glabrous, flaccid when very elongate, base rounded, margins scabrid, midrib and veins slender, sheaths shorter than the internodes, compressed,

loose, glabrous, keeled, mouth not auricled, ligule short, membranous, ciliate; spikes few or many, often fascicled, 2–4 in. long, erect, strict or curved, herbaceous, dark green, rhachis almost inarticulate, internodes broad, much shorter than the spikelets, glabrous, striate; spikelets glabrous, callus small, naked; sessile spikelet $\frac{1}{7}$–$\frac{1}{6}$ in.; glume I oval-oblong, subacute, thinly coriaceous, 7–9-veined, II as long, adherent to the cavity of the internode, oblong-ovate, acute, membranous, 3-veined (2 submarginal), III and IV shorter, oblong, obtuse, hyaline, veins 0, palea very short, linear, obtuse; anth. $\frac{1}{10}$ in. or shorter; pedicelled spikelet longer and narrower than the sessile, male or if bisexual with very small anth., glumes I and II lanceolate, acuminate, herbaceous, III and IV as in the lower spikelet.

Common in warmer parts of the Island.
All warm countries.

2. **R. exaltata,** *Linn. f. Suppl.* 114 (1781).
Thw. Enum. 364. C. P. 2386.
Fl. B. Ind. vii. 156. Roxb. Cor. Pl. t. 157.

Perennial; stems 6–10 ft., stout, erect, leafy, solid, smooth, branching from the base, glabrous, or hairy below; l. 6–24 by $\frac{1}{4}$–1 in., linear-lanceolate, setaceously acuminate, narrowed from the middle to the base, scaberulous on both surfaces, margins spinulosely scabrid, midrib stout, prominent beneath, smooth, veins very slender, sheaths loose, glabrous or hispid, mouth contracted, ligule short, ciliate; spikes 3–6 in., terete, glabrous, fragile, tip slender with imperfect spikelets, internodes $\frac{1}{6}$–$\frac{1}{3}$ in., dorsally rounded, smooth; sessile spikelet rather shorter than the internode, $\frac{1}{6}$–$\frac{1}{5}$ in.; glume I ovate-oblong, obtuse or tip emarginate, thickly coriaceous, smooth, base truncate, veins many, obscure, margins scaberulous, II gibbously convex or hemispheric, acute, chartaceous, 9–11-veined, keel scabrid shortly winged towards the tip, III oblong, acute, 3-veined, rigid, paleate, male, palea like the glume, coriaceous, margins hyaline, IV shorter, ovate from a broad base, acute, 1-veined, fem., palea like the glume, obtuse, 2-veined; lodicules quadrate, subulate at one angle; anth. $\frac{1}{10}$ in.; style and stigmas short; pedicelled spikelet more or less imperfect, male or neuter, glume I narrowly winged, II–IV narrower, paleas of III and IV notched at the tip.

Common in the hotter parts of the Island.
Plains and lower hills of India, and in Trop. Asia, Africa, Australia, Jamaica.

3. **R. nigrescens,** *Thw. Enum.* 364 (1864).
C. P. 867.
Fl. B. Ind. vii. 157.

Stem 3–4 ft., suberect, or prostrate and rooting at the lower nodes, slender or stout below, branched, leafy, smooth, glabrous or sparsely hairy, solid; l. 4–8 by $\frac{1}{6}$–$\frac{2}{3}$ in., linear-lanceolate from a broad cordate ciliate base, acuminate, thin, sparsely hairy above, more so beneath, margins smooth or scaberulous, midrib and veins slender, sheaths loose, hispid or glabrous, margin and mouth ciliate, ligule short, ciliate; spikes solitary, sheathed at the base, 2–3 in. long, slender, terete, glabrous, internodes $\frac{1}{8}$–$\frac{1}{6}$ in., dorsally rounded, smooth; sessile spikelet rather longer than the internode; glume I shortly oval, coriaceous, convex, minutely cancellate in 9 rows, tip with two small scarious rounded wings, margins smooth, II coriaceous, cymbiform, acute, 3–5-veined, keel smooth, shortly winged below the tip, III hyaline, ovate-oblong, obtuse, paleate, neuter, veins 0, palea rather smaller, IV smaller than III, orbicular-oblong, 2-toothed, palea oblong, 2-toothed, lodicules trigonous; anth. $\frac{1}{10}$ in.; pedicelled spikelet smaller, male or neuter, glumes I and II narrower, herbaceous, veins strong, green, I smooth, with a single unilateral terminal wing, III epaleate, IV triandrous, tip entire or notched.

Central Provinces, alt. 4000 ft. (Thwaites).

Endemic.

Ferguson says of this plant (Gram. Indig. to Ceylon, 21), 'I found it in the edges of forest, Abbotsford, at an elevation of 5000 to 6000 ft., in April 1869. At this elevation it is a small compressed plant, and seems to be eaten by wild animals.'

### 31. **MANISURIS,** *Sw.*

Annual, erect, slender, leafy grasses; l. flat, base cordate, amplexicaul; spikes small, terete, axillary and terminal, shortly peduncled, rhachis green, at length fragile, glabrous, internodes short, broad, excavate opposite the sessile spikelets; spikelets minute, in very dissimilar pairs, a sessile bisexual and a pedicelled male or neuter, the pedicel adnate or closely appressed to the rhachis; sessile spikelet, glume I globose, hollow, coarsely pitted, with a ventral orifice appressed to the cavity in the rhachis, coriaceous, at length crustaceous, callus tumid, glabrous, II minute, oblong, coriaceous, 1-veined, closing the orifice of I, III and IV very minute, hyaline, convolute, and together forming a conical envelope to the stam. and ov., III orbicular, IV (palea?) smaller, broadly oblong; lodicules subquadrate; anth. minute, connective very short; ov. globose, styles and stigmas short; pedicelled spikelet of 2 green glumes, I orbicular, flat,

margined with a broad hyaline ciliate wing, veins 5–7, very broad, II laterally compressed, cymbiform, 5–7-veined, keel with a dorsal hyaline ciliate wing, III and IV 0, or hyaline; grain subglobose.—Sp. 2; both in *Fl. B. Ind.*

**M. granularis,** *Linn. f. Nov. Gram. Gen.* 37 (1779).
Thw. Enum. 364. Hack. Monogr. Androp. 314. C. P. 81.
Fl. B. Ind. vii. 159. Gaertn. Fruct. ii. t. 175. Beauv. Agrost. t. 21, f. 10. Roxb. Pl. Corom. t. 118.

Stems 1–2½ ft., and l. softly hairy, flaccid, branching, leafy to the top, branches and l. erect, nodes hairy; l. 4–10 by ¼–½ in., linear, acute or acuminate, flat, upper often spathiform, hairy on both surfaces or beneath only, hairs often tubercle-based, margins ciliate, midrib slender, sheaths much shorter than the internodes, lax, mouth not auricled, ligule of long silky hairs; spikes ¼–1 in., solitary or seemingly fascicled in the axils of the l., but individually from shortened axilllary branches, ped. short, hairy; sessile spikelets $\frac{1}{16}$–$\frac{1}{13}$ in. diam., scaberulous.

Common in the hot, drier parts of the Island.
Tropics generally.
A very curious grass. The spikes resemble a string of minute beads. Except *Pharus*, no Ceylon grass shows so great a dissimilarity between the two forms of spikelet in the same species.

## 32. MNESITHEA, *Kunth.*

A slender, erect, perennial grass; l. narrow; spikes solitary, slender, rhachis articulate, fragile, internodes terete, ribbed, all but a few upper with 2 equal and similar spikelets, sunk in subopposite oblong cavities, separated by a hyaline often evanescent septum, and with sometimes a minute glume of a third spikelet on the upper margin of the internode; sessile spikelets 1-fld., nearly as long as the internode; glumes 4, I closing the mouth of the cavity, obliquely oblong, obtuse, thinly coriaceous, smooth, margins narrowly incurved, II and III as long as I, oblong, obtuse, hyaline, III paleate or not, empty, IV rather smaller, oblong, obtuse, bisexual, palea shorter than the glume; lodicules 0; stam. 3, anth. linear; ov. minute, styles and stigmas very small, not exserted; upper spikelet seen only in the upper 1-fld. internodes, pedicel confluent with the walls of the internode, its margins marked by 2 ribs; glume I very minute, orbicular or broadly ovate, flat, green, II very narrow or 0; grain narrowly oblong, compressed, embryo two-thirds its length.—Monotypic.

This curious plant has been described under six generic names; three of them are those of pre-established genera, *Rottboellia* by Roxburgh, *Hemarthria* by Kunth, and *Ophiurus* by Trinius, and three were founded on itself, *Diperium*, Desv. (1831), *Thyridostachyum*, Nees (1836), and that under which it is here described. A re-examination of it since the publication of the Flora of British India has convinced me that it is a well-founded genus.

**M. lævis,** *Kunth*, *Revis. Gram.* i. 154 (1840).

Thw. Enum. 364. *Rottboellia perforata*, Roxb. Pl. Corom. ii. 43. C. P. 873. *Ophiurus perforatus*, Trin.; Hack. Monogr. Androp. 319.

Fl. B. Ind. 158 (*Rottb. perforata*). Kunth, Enum. Pl. Suppl. t. 18, f. 3. Desv. Opusc. t. 6, f. 3 (*Diperium cylindricum*).

Stem 2–4 ft., erect, rather slender, simple or branched above, as thick as a crow-quill below, smooth, solid; l. 6–12 by $\frac{1}{10}$–$\frac{1}{8}$ in., linear, acuminate, rigid, flat, glabrous except at the base, margins and midrib beneath scabrid, base narrowed, midrib and 2–3 pairs of veins very prominent beneath, sheaths tight, glabrous, mouth not auricled, ligule very short, membranous, toothed; spikes 4–8 in., shortly exserted from the uppermost sheaths, erect, internodes about $\frac{1}{5}$ in. long, contracted in the middle, ribs green; glume I nearly as long as the internodes, tip sometimes narrowly margined, base truncate, veins 5–7, very obscure, ending in little pits above the base; anth. $\frac{1}{10}$ in.; grain $\frac{1}{12}$ in.

Hotter parts of the Island.

Throughout India, Afghanistan, Burma, China.

## 33. **ISCHÆMUM,** *L.*

Annual or perennial grasses; infl. of solitary digitate or fascicled articulate spikes, internodes of rhachis and pedicels of upper spikelets trigonous, ventrally hollowed; spikelets binate, a sessile and pedicelled, each often 2-fld., a male and a fem. or bisexual, deciduous with the internode, pedicelled spikelet usually differing in size or shape from the sessile, but sometimes altogether similar to it; sessile spikelet, glumes 4, I and II subequal in length, coriaceous or chartaceous, awnless or II awned, I ovoid-oblong or oblong-lanceolate, convex, on sides smooth, nodose below the middle, above it flatter, veined, and more or less winged on each side, sides broadly or narrowly incurved, II lanceolate, acuminate, concave, III nearly as long as I, usually membranous, acute or acuminate, paleate, triandrous, rarely empty, palea narrower, lanceolate, acuminate, 2-veined, usually with an opaque rigid centre and broad inflexed hyaline flaps, IV hyaline, bisexual or fem., deeply 2-cleft, 3-veined, awned, awn geniculately inserted dor-

sally at the sinus, very slender, smooth, or nearly so, column brown twisted, palea narrow, hyaline; lodicules cuneate or quadrate; styles usually and stigmas short; pedicelled spikelets like or unlike the sessile, pedicel half as long as the sessile spikelet or shorter, glume I, often dimidiate-ovate, flattened and broadly winged, glume IV usually oblong, obtuse, or minutely 2-lobed, awnless, rarely as in the sessile spikelet. —Sp. about 40; 27 in *Fl. B. Ind.*

See remarks under *Pollinia.*

Sect. I. **Euischæmum.**—Spikes 2 or more, rarely solitary, veins of glume I obscure.
  Margins of glume I of sessile spikelet narrowly inflexed or incurved from base to top.
    L. rounded at the base.
      Glume I of sessile spikelet with nodulose margins . . . . . . . 1. I. ARISTATUM.
      Glume I closely transversely ridged . 2. I. RUGOSUM.
    L. hastate sagittate or cordate at the base.
      Glume I of sessile spikelet transversely ridged . . . . . . . 3. I. SEMISAGITTATUM.
      Glume I of sessile spikelet smooth . . 4. I. COMMUTATUM.
  Margins of glume I narrowly incurved above, broadly below.
    Keel of glume II winged above the middle.
      Spikes glabrous . . . . . . 5. I. MUTICUM.
      Spikes more or less villous . . . 6. I. CILIARE.
    Keel of glume II not winged.
      Stem stout, suberect . . . . . 7. I. RIVALE.
      Stem slender, creeping below . . . 8. I. TIMORENSE.
Sect. II. **Sehima.**—Spike solitary, glume I of sessile spikelet flat, with strongly raised veins . . . . . . . . . 9. I. LAXUM.

1. **I. aristatum,** *Linn. Sp. Pl.* 1049 (partim) (1753).
*I. barbatum*, Retz.; Thw. Enum. 364. Moon, Cat. 72. C. P. 700, 869, 994.
Fl. B. Ind. vii. 126. Burm. Fl. Ind. t. 21, f. 8 (bad).

Perennial; stem 1–4 ft., stout, erect, simple or branched, leafy, glabrous, thickened towards the spikes; l. 4–10 by $\frac{1}{4}$–1 in., linear-lanceolate, acuminate, flat, glabrous or sparsely hairy, glaucous beneath, narrowed to the acute or cordate sometimes petiolulate base, margins scabrid, midrib slender, veins 3–many pairs, sheaths loose, glabrous, mouth naked, auricled, auricles up to $\frac{1}{2}$ in. long, or short, margins membranous, ligule membranous; spikes 1 or 2, up to 6 in. long, erect, stout or slender, fragile, internodes $\frac{1}{2}$ as long as the spikelets or shorter, stout, tumid or subclavate, more or less bearded; spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., sessile and pedicelled pressed closely together, hirsute villous or nearly glabrous, callus very

short, broad; sessile spikelet, glume I ovate- or linear-oblong, cartilaginous or coriaceous below the middle, with 2–4 marginal nodules on each side transversely connected by shallow ridges, above the middle thinner with green anastomosing veins and usually unequal narrow ciliolate wings, towards the obtuse or 2-toothed tip, margins narrowly incurved, ciliolate, II lanceolate, acuminate, chartaceous, subscaberulous, I-veined, keel rounded smooth, III and IV and paleas eciliate, sometimes punctulate, III ovate-lanceolate, acuminate, 1-veined, membranous, male or bisexual, palea oblong, rather thicker, IV. oblong, fem., cleft to the middle or lower into lanceolate acuminate lobes, 3-veined below, awn $\frac{1}{2}$–$\frac{2}{3}$ in., geniculately inserted at the sinus, palea linear-oblong; pedicelled spikelet broader than the sessile, inarticulate on the very short thick amorphous pedicel; glume I coriaceous, flattened, broadly winged, wing semicircular, acinaciform or dimidiate-ovate, margins ciliolate, glumes II and III and paleas as in the sessile spikelet, II male or bisexual, III fem., IV linear-oblong, obtuse or minutely 2-lobed with a mucro; grain $\frac{1}{8}$–$\frac{1}{6}$ in., ellipsoid-oblong, compressed.

Var. **fallax,** *Hack. Monogr. Androp.* 204. Fl. B. Ind. l. c. C. P. 700, 994.

Stem more slender, prostrate below and ascending, l. smaller, narrower, sometimes long-petioled, ligule shorter, ciliate, spikes more slender, sparsely hairy.

Very common in the Island (Ferguson). Var. *fallax*, Bintenna and Peradeniya.

Throughout the plains and lower hills of India, Malaya, China.

I cannot distinguish the vars. *barbatum* and *imberbe* in the Peradenya Herbarium, where specimens from the same locality and on the same sheet present spikelets varying from almost glabrous to densely villous, with narrow and broad glumes, especially variable as to glume I of pedicelled spikelet. The number and prominences of nodes on the sides of glume I of the sessile spikelets are unstable characters, as are the length and breadth of the leaves and of the ligule, Var. *fallax* looks very different from the common large form of *aristatum*, but I find no characters for it other than those given above. Hackel has a var. *elatum*, with hirsute sheaths, from Silhet and Ceylon, of which I have seen no Ceylon specimen.

2. **I. rugosum,** *Salisb. Ic. Stirp. Rar.* 1 (1791).
Thw. Enum. 364. C. P. 870.
Fl. B. Ind. vii. 127. Salisb. l. c. t. 1. Gaertn. f. Fruct. Suppl. t. 181.

Annual; stem 1–2 ft., rather stout, tufted, erect or ascending, leafy, compressed, slightly thickened beneath the infl., nodes glabrous or bearded; l. 4–6 by $\frac{1}{6}$–$\frac{1}{2}$ in., linear-lanceolate, acuminate, flat, flaccid, smooth, glabrous or

sparsely hairy on both surfaces, margins scabrous, base rounded, sometimes tomentose, uppermost l. sometimes reduced to a spathiform lanceolate sheath 3–4 in. long partially enclosing the spikes, sheaths loosely compressed, glabrous, mouth auricled, auricles membranous, confluent with the truncate ligule; spikes 2, 1–3 in. long, erect, striate, fragile, internodes $\frac{1}{3}$–$\frac{1}{2}$ as long as the sessile spikelets, sub-clavate, trigonous, ciliate on the dorsal angle; spikelets $\frac{1}{8}$–$\frac{1}{4}$ in. long, linear-oblong, nearly glabrous or villous, sessile and pedicelled pressed together, the very short thick pedicel confluent with the thick sparsely bristly callus of the sessile; glume I of sessile spikelet cartilaginous and shining below the middle and there crossed by 3–5 deep, convex, almost imbricating smooth ridges, above the middle flattened, thinner, dimidiate-ovate, veins green, anastomosing, margins thick narrowly incurved, ciliolate, outer narrowly winged, II coriaceous, lanceolate, acuminate, laterally compressed, keeled, scaberulous, keel with a narrow ciliolate wing below the tip, III and IV and paleas all eciliate, III ovate-lanceolate, acuminate, hyaline, 1–3-veined, male or neuter, palea narrower, hyaline, 2-veined, IV shorter, deeply cleft into 2 lanceolate acute lobes, base 3-veined, awn up to $\frac{2}{3}$ in., palea linear-lanceolate; lodicules minute, cuneate; pedicelled spikelet very variable, glume I like the sessile or with obscure transverse ridges, and a broader more oblique upper half, glumes I to III when most perfect are as in the sessile spikelet, but II not keeled or ciliate, and IV oblong, obtuse, awnless; grain broadly elliptic-oblong, compressed, brown, $\frac{1}{10}$ in. long.

Hotter parts of the Island.

India, Andaman Islds., Malaya, China.

The various forms assumed by the pedicelled spikelet are puzzling; it very frequently ripens a grain. Hackel (who had not seen Ceylon specimens) describes (under the genus) the pedicelled spikelet as articulate on the pedicel, which it is not in *I. rugosum* and *aristatum*, for it falls away with the sessile glume and internode of the spike; as does the grain from the glumes. There are two forms of foliage in this species in Herb. Peraden.; one, the original plant, is named by Thwaites from Kara Kada Walla, Gardner (C. P. 870), with very narrow leaves, obscure veins, and long ligule; the other, from Mannar district, collected and named by Trimen (not numbered), with leaves up to $\frac{1}{2}$ in. broad, 4 or more pairs of rather strong lateral veins and a shorter ligule. The spikes and spikelets of the two appear to be identical.

3. ***I. semisagittatum,** *Roxb. Hort. Beng.* 8 (1814); *Fl. Ind.* **i.** 320 (1832).

*I. conjugatum*, Roxb.; Thw. Enum. 365. C. P. 3263.

Fl. B. Ind. vii. 130.

Annual; stem 1–2 ft., slender, flaccid, prostrate and branching below, rooting at the lower nodes, internodes long, nodes glabrous or hairy; l. 3–5 in., oblong- or linear-lanceolate, acuminate, tips capillary, base auricled, broadly cordate lunate or sagittate, with a filiform petiole $\frac{1}{2}$–$1\frac{1}{2}$ in. long, flat, glabrous or sparsely hairy, margins scabrid, midrib slender, veins 3–5 pairs, bases descending into the auricles, sheaths loose, often ventricose, of uppermost l. usually 2–3 in., spathiform, margins broadly auricled, mouth and truncate ligule membranous; spikes 2, 1–$2\frac{1}{2}$ in. long, more or less softly villous all over with long white or grey hairs, fragile, internodes and pedicels much shorter than the spikelets, trigonous, inflated; sessile spikelet $\frac{1}{6}$–$\frac{1}{8}$ in., callus short, thick; glume I, ovate, convex, tip 2-toothed, margins narrowly incurved, lower half rather thick, transversely obscurely ridged, ridges ending in marginal nodules, upper thinner with green veins and ciliolate margins, II rather coriaceous, oblong, obtuse, keeled, softly ciliate, dorsally villous, III ovate, acuminate, 1–3 veined, scaberulous above, paleate, male, palea linear-oblong, hyaline 2-veined, IV fem., cleft to below the middle into linear lobes, base 3-veined, awn about $\frac{1}{2}$ in., palea linear-oblong, truncate 2-veined; lodicules cuneate; anth. $\frac{1}{8}$ in.; styles and stigmas short; pedicelled spikelet narrower than the sessile, glume I narrowly oblong, not ridged, II and III and paleas as in the sessile spikelet, IV as long as II, narrowly oblong, tip 2-toothed with a minute awn, III male, IV fem.

Colombo, on *débris* thrown out from the bazaars (Ferguson).
Bengal and the Deccan.

This is the Ceylon *I. conjugatum*, Roxb., of Thwaites, introduced into Hackel's monograph, Fl. B. Ind., as a Ceylon plant. It is, I think, *I. semisagittatum* var. *dasyanthum*, Hack. The only difference given by Roxburgh between *I. conjugatum* and *I. semisagittatum* is, that in the former the two spikes are 'united at the base, continuing close, as if one.' This character does not hold good, and is not alluded to by Hackel, who places the two species under different subdivisions, that including *conjugatum* having 2–4 marginal nodules on glume I of the sessile spikelet, whilst in *semisagittatum* glume I is transversely rugose with close-set elevated ridges. But neither of these characters is constant in Indian specimens, and the Ceylon ones agree with neither, for they have very low ridges and marginal nodules. The two plants are undoubtedly co-specific, as Hackel suspects by his remark under *I. semisagittatum*, '*I. conjugato*, Roxb., satis affine.'

4. **I. commutatum,** *Hack. Monogr. Androp.* 209 (1889).
*I. semisagittatum*, Thw. Enum. 365 (non Roxb.). C. P. 2625.
Fl. B. Ind. vii. 131.

Perennial; stems 1–2 ft., slender, ascending from a decumbent base, glabrous; l. 1–3 by $\frac{1}{6}$–$\frac{1}{2}$, linear or oblong-

lanceolate, acuminate, flat, softly sometimes villously hairy on both surfaces, base cordate, often unequally, with sometimes a short petiole, margins scabrid, midrib slender, veins 3–5 pairs, sheaths loose, glabrous or hairy, auricles large, ciliate, united by the hyaline ligule; spikes 1 or 2, 2–3 in. long, rhachis slender, fragile, internodes about $\frac{1}{7}$ in., dorsally silkily ciliate; sessile spikelet $\frac{1}{4}$ in., oblong, callus short, thick, shortly densely bearded; glume I coriaceous, ovate or oblong, glabrous, smooth, polished, usually constricted about the middle, margins narrowly incurved, lower half tumid, sides sometimes nodose, upper thinner, flatter, bicuspidate, 2-winged, and with green anastomosing veins between the wings, which vary in breadth and are ciliolate, II chartaceous, ovate-lanceolate, acuminate, 3-veined, tip bicuspidate with often an interposed slender recurved awn sometimes longer than the glume, keel smooth, III oblong-lanceolate, hyaline, 1–3-veined, 3-androus, upper margins ciliolate, palea oblong, opaque, wings hyaline, IV shorter, deeply 2-lobed, lobes obtuse, bisexual, palea narrow, 2-veined, awn $\frac{1}{2}$–$\frac{2}{3}$ in., geniculately inserted at the sinus; styles short, stigmas narrow; pedicelled spikelet, glume $\frac{1}{5}$ in. long, glabrous, callus obsolete, pedicel $\frac{1}{3}$–$\frac{1}{2}$ as long as the internode, glume I flattened, with the broad unilateral wing dimidiate-ovate, obtuse, margins ciliolate, III empty and its palea narrower than in the sessile spikelet, IV oblong, obtuse, muticous, male.

Central Province, ascending to 6000 ft. (Ferguson). Watta Kellia Hill, Ambagamuwa, Dimbulla.

Nilgiri Hills.

I find considerable variation in the ciliate or eciliate ligule and size of the auricles of the l.-sheaths, in the form and sculpture of glume I of the sessile spikelets, and in the form and ciliation of glume III and its palea.

5. **I. muticum,** *Linn. Sp. Pl.* 1049 (1753).
Thw. Enum. 364. C. P. 868, 3048.
Fl. B. Ind. vii. 132. Gaertn. f. Fruct. Suppl. t. 181. Rheede, Hort. Mal. xii. t. 47.

Rootstock 1–2 ft. long, creeping and rooting, simple or branched, giving off rather stout stiff polished ascending leafy stems 4–12 in. high; l. bifarious 1–3$\frac{1}{2}$ by $\frac{1}{6}$–$\frac{1}{4}$ in., linear-oblong to oblong-lanceolate, acuminate, strict, flat, coriaceous, rigid, smooth on both surfaces, glabrous or hairy and ciliate towards the base, brown when dry, margins smooth or scaberulous, base rounded or cordate, midrib slender, veins obscure, sheaths mostly longer than the nodes, subcompressed, tight or loose, coriaceous, glabrous or hairy, uppermost often spathiform and embracing the spike, mouth shortly auricled, ligule

short, truncate; spikes 2, shortly peduncled, $\frac{1}{2}$–1$\frac{1}{2}$ in. long, closely appressed together, perfectly glabrous, rhachis fragile, internodes about $\frac{1}{2}$ as long as the spikelets, acutely trigonous, angles glabrous or minutely ciliate; spikelets 1-fld., sessile and pedicelled closely appressed; sessile $\frac{1}{5}$–$\frac{1}{3}$ in., callus short, broad, glabrous; glume I ovate or oblong, convex, coriaceous, flatter and narrowly winged from above the middle to the minutely truncate or 2-toothed tip, margin narrowly incurved above, broadly below, II as long as I, ovate-lanceolate, acuminate or shortly awned, coriaceous, 5-veined, keel smooth, narrowly winged from above the middle to the tip, III oblong-lanceolate, acute, firm, with a narrow ciliate wing, 5–7-veined, triandrous, palea as long, lanceolate, acuminate, coriaceous with a hyaline ciliolate wing, IV bisexual, oblong, obtuse, aristulate, coriaceous with broadly hyaline sides, 1–3-veined, tip ciliolate, palea nearly as long as the glume, narrow; lodicules large; anth. linear; styles short, stigmas very large; pedicelled spikelet smaller than the sessile, pedicel stout, sometimes very short, angular; glume I narrow, II obscurely winged dorsally, under the tip; sexes as in the sessile spikelet.

Common, especially on sandy shores.

Southern India, from Canara southward, Burma, Malaya, China, Australia.

Very common on the shores of lakes, where it is a low creeping plant, with white stoloniferous underground stems. In the jungle, where it gets support, it is a tall coarse grass and grows to the length of several feet. It is at once distinguishable by its white flowers. Large quantities are collected by the grass-women for horse-food in Colombo, but it is a coarse fodder (Ferguson).

6. **I. ciliare,** *Retz. Obs.* vi. 36 (1791). **Rat-tana,** *S.*

*Spodiopogon obliquivalvis*, Nees; Thw. Enum. 365 (excl. some syn.). *S. zeylanicus*, Nees ex Steud. Syn. Gram. 373, 377. *Andropogon Macræi*, Steud. l. c. 377. C. P. 874, 875, 3167, 3235.

Fl. B. Ind. vii. 133.

Perennial (?); stems erect or ascending, sometimes decumbent below for a foot or more, and rooting at the nodes, slender, nodes glabrous or bearded; l. 2–6 by $\frac{1}{6}$–$\frac{1}{2}$ in., linear or linear-lanceolate, acuminate, flat, narrowed from the middle to the rounded or acute sessile base, glabrous, hirsute, or villous on both surfaces, margins scabrid, midrib slender, veins obscure, or 3–5 distinct pairs, sheaths glabrous or hirsute, compressed, loose, auricles rounded, ciliate, ligule membranous, ciliate; spikes 2, 1$\frac{1}{2}$–3 in. long, $\frac{1}{4}$ in. diam. across the spikelets, or more slender, rhachis fragile, internodes and pedicels of upper spikelets subequal forming a fork with the sessile spikelets opposite the rounded sinus, erect,

compressed, trigonous, bearded dorsally and on the angles; sessile spikelet $\frac{1}{7}$–$\frac{1}{5}$ in., oblong or ovoid-oblong, callus very short, bearded; glume I bicuspidate, coriaceous, convex, smooth or pitted, hirsute below the middle, flatter and veined above the middle with lateral ciliolate broad or narrow wings, margins narrowly incurved above, broadly below, II as long as or longer than I, chartaceous, lanceolate, acuminate or awned, 5-veined, keel narrowly winged towards the tip, III ovate-lanceolate, acuminate, ciliate towards the tip, triandrous, palea lanceolate, acuminate, opaque with broad hyaline ciliolate wings, IV fem., cleft to the middle, base 3-veined, lobes oblong, obtuse, ciliate, awn $\frac{1}{3}$–$\frac{1}{2}$ in., palea lanceolate, acuminate, 2-veined, eciliate; anth. $\frac{1}{8}$ in.; styles and stigmas short; pedicelled spikelet like the sessile, glume IV usually awned.

Throughout the Island; common (Ferguson).

Plains and lower hills of India, Nicobar Islds., Malaya, China, Australia.

The two principal forms of this variable grass in Herb. Peraden. are:—

1. Stem 1–1$\frac{1}{2}$ ft., erect or suberect, leafy chiefly towards the base; l. up to $\frac{1}{2}$ in. broad, linear-lanceolate, sparsely hairy, sheaths glabrous, spikes villous, glume I smooth. Var. *longipilum*, Hack. C. P. 3167.

2. Stem tall, decumbent and creeping below; l. narrower and sheaths nearly glabrous, spikes more slender, less hairy, spikelets smaller, glume I often transversly pitted. C. P. 875. 3167 (in part), 3235. Includes vars. *prorepens*, *scrobiculatum*, and *malacophyllum* of Hackel, wholly or in part.

One form of this grass is reserved in fields and under the shade of coco-nut trees in and near Colombo, and extensively brought into town as fodder for cattle. Is well known as the Rat-tana, literally red grass of the Sinhalese (Ferguson).

7. **I. rivale,** *Hack. Monogr. Androp.* 228 (1889).

*I. pilosum*, Nees, ex Trim. Cat. Ceyl. Pl. 107 (non Hack.). *Spodiopogon rivalis*, Thw. MSS. C. P. 3871.

Fl. B. Ind. vii. 136 (*I. hirti*, Hack. *forma*).

Perennial; stems 2–3 ft., stout, much branched, leafy, glabrous, smooth, polished, nodes glabrous, or upper tomentose; l. 3–5 by $\frac{1}{6}$–$\frac{1}{4}$ in., linear-lanceolate, narrowed from about the middle to the finely acuminate tip and base, flat, glabrous or ciliate at the very base, smooth on both surfaces and nearly so on the margins, midrib slender, sheaths glabrous, mouth not auricled, ciliate, ligule very short, membranous, eciliate; spikes 2–4, 2–3 in. long by $\frac{1}{4}$ in. across the spikelets, rhachis fragile, internodes and pedicels not half as long as the spikelets, stout, compressed, rigidly long-ciliate, sessile spikelet $\frac{1}{5}$–$\frac{1}{4}$ in., callus rather large, stout, very shortly bearded; glume I oblong-ovate, bicuspidate, coriaceous, tumid below the middle, more flattened above it, 7–9-veined, sparsely hairy,

margins with serrulated wings from the middle upwards, narrowly incurved above, very broadly below, II chartaceous, lanceolate, acuminate, faintly 5-veined, dorsally smooth rounded, and margins narrowly ciliate, III ovate-lanceolate, acuminate, 1-veined, male or empty, palea lanceolate, thickened with hyaline wings above, IV fem. or bisexual, broadly 2-lobed to the middle, 3-veined, lobes dimidiate-ovate, ciliolate, awn about $\frac{1}{4}$ in., palea linear-lanceolate, eciliate, puncticulate; styles rather short, stigmas very long, slender; pedicelled spikelet rather smaller than the sessile, glume I lanceolate, acute, the wings coalescing in a flat scaberulous point, glume II–IV as in the sessile, but fem. only, and ripening an ovoid-oblong grain.

Matelle East (Beckett).

As stated in Fl. B. Ind., I regard the Ceylon *I. rivale* as an endemic glabrous-leaved form of the Khasian *I. hirtum*, with more than two spikelets, and glabrous glume I. Dr. Trimen having kept it as a distinct species in the Peradeniya Herbarium, I have followed him here. The similarity of the sessile and pedicelled spikelets is as in *Pollinia*.

8. **I. timorense,** *Kunth, Revis. Gram.* i. 369 (1835).

*I. timorense*, var. *zeylanicum*, Hack.; Trim. Cat. Ceyl. Pl. 107. *Spodiopogon obliquivalvis*, Nees; Thw. Enum. 365 (in part). C. P. 3168.

Fl. B. Ind. vii. 136. Kunth, l. c. t. 98.

Stem 6–18 in., slender, branching, decumbent straggling and rooting at the lower nodes, glabrous or nodes sparsely bearded; l. 3–6 by $\frac{1}{3}$–1 in., lanceolate or linear-lanceolate, acuminate, thin, flat, base acute (or of small uppermost rounded), acuminate or narrowed into a slender petiole up to 2 in. long, smooth or scaberulous on both surfaces, margins scaberulous, midrib very slender, veins 4–6 pairs, sheaths loose, glabrous, mouth not auricled, ciliate, ligule very short, membranous; spikes binate, a sessile and shortly peduncled, 1–3 in. long, about $\frac{1}{6}$ in. across the spikelets, fragile, internodes slender, shorter than or equalling the pale reddish-brown spikelets, more or less shortly ciliate; sessile spikelet $\frac{1}{3}$–$\frac{1}{5}$ in., callus rather long, cylindric, sparsely bearded; glume I ovate, bicuspidate, tumid, rounded, thinly coriaceous and shining below the middle, above it thinner and 5–9-veined, glabrous or sparsely hairy, wings 0, margins narrowly involute above, broadly and almost auricled below, II lanceolate, acuminate or aristulate, dorsally rounded, 1–5-veined, III empty or male, oblong, acute, margins above dilated and broadly hyaline, palea lanceolate, opaque, with very broad ciliolate hyaline wings, IV bisexual, oblong, cleft to the middle into lanceolate, acuminate lobes, 3-veined below, eciliate, awn $\frac{1}{3}$ in. or longer, palea lanceolate; pedicelled spikelet usually very small,

reduced to one or rarely 4 glumes, then awned and male, pedicel slender, sometimes nearly as long as the sessile spikelet.

Central Province, Peradeniya, Hantane, between Eratne and Palabadulla, abundant (Trimen).

Bengal, Central India, Burma, Malaya.

Dr. Trimen's specimens have much larger and longer-petioled l. than any other Ceylon or Indian forms known to me. Awn short in Ceylon specimens. I find the foliage of this species to be too variable to afford characters for varieties. Glume I is almost or quite glabrous and shining.

Affects damp and shady places from the coast up to the Kandyan country, and is very seldom found in flower. It is an excellent and abundant fodder (Ferguson).

9. **I. laxum,** *Br. Prod.* 205 (1810).
Trim. Cat. Ceyl. Pl. 107. *I. nervosum*, Thw. Enum. 365. C. P. 3138.
Fl. B. Ind. vii. 136.

Perennial; stem 2–3 ft., tufted on a short rootstock, simple, slender, erect, glabrous, leafy, nodes glabrous; l. 6–12, by $\frac{1}{10}$–$\frac{1}{6}$ in., erect, linear, narrowed to long capillary tips, flat, smooth, striate, glaucous beneath, margins minutely scaberulous, base not contracted, midrib very slender, sheaths shorter than the internodes, glabrous or sparsely hairy, mouth not auricled, ligule of silky hairs; spike solitary, 2–3 in., suberect, fragile, internodes and pedicels of upper spikelets about half as long as the spikelets, compressed, sides silkily ciliate with long hairs; sessile spikelet $\frac{1}{3}$ in., callus short, obtuse, shortly bearded; glume I green, thin, oblong-lanceolate, acuminate, tip 2-toothed, teeth ending in short capillary ciliate flaccid awns, margins inflexed, keeled, keels minutely scaberulous and ciliate, veins 6, median 0, 2 marginal, 4 dorsal in pairs diverging from the base and converging and anastomosing in the upper third of the glume, marginal terminating in the awns of the apical teeth, II concave, membranous, ovate-lanceolate, acuminate, terminating in a slender scabrid awn longer than the glume, margins ciliate, keel rounded with a narrow ciliate dorsal wing running from the entire or 2-toothed tip on to the awn, veins 3, very slender, III lanceolate, acuminate, hyaline, veinless, ciliate with long recurved hairs, paleate, triandrous, palea oblong, obtuse, ciliate, IV deeply cleft into lanceolate long-ciliate lobes, 3-veined below, paleate, fem., awn up to 1$\frac{1}{4}$ in., palea linear-oblong; lodicules obliquely cuneate; anth. $\frac{1}{8}$ in.; styles short, stigmas rather long; pedicelled spikelet as long as the sessile; glume I chartaceous, red-brown, lanceolate, acuminate, with the tip toothed and awned as in the sessile spikelet, veins 7, strong, one median, three submarginal on each side, margin narrowly inflexed,

keels minutely scaberulous, obscurely winged on one margin towards the tip, II ovate-lanceolate, acuminate, 1-veined, ciliate, tip terminating in a short flaccid ciliate awn, III and its palea as in the sessile spikelet, empty or triandrous, IV and its palea linear-oblong, obtuse, ciliate with long hairs, triandrous, awn 0.

Central and Uva Province, alt. 3000–4000 ft. Passalowa, Hakgala, Welimoda.

Central and Southern India, Burma, eastward to Australia and westward to the Cape Verd Islds.

I have described the spikelets from the Ceylon specimens at length, as they differ somewhat from Indian and other specimens, in the venation of glume I of the sessile and pedicelled spikelets, and in the curious capillary awns terminating the apical teeth.

### 34. EREMOCHLOA, *Büse.*

Perennial grasses; l. chiefly radical, exactly linear, obtuse, flat, sheaths compressed; infl. a solitary, elongate, curved, compressed, glabrous spike, rhachis subfragile, internodes clavate, compressed, hollow; spikelets solitary, secund, sessile, 2-fld., closely imbricating, dorsally strongly compressed, deciduous with the internode and the pedicelled or sessile rudiments of an upper spikelet, awn 0; glume I orbicular or ovate, flat, margins narrowly incurved, pectinately armed with long spreading upcurved spines, II oblong-lanceolate, acute or acuminate, 3-veined, III and palea oblong, obtuse, male, IV smaller, oblong, obtuse, bisexual, palea as long as the glume, linear-oblong, truncate; lodicules cuneate; anth. narrow; styles and stigmas rather short; grain oval, plano-convex.—Sp. 8; 5 in *Fl. B. Ind.*

Glume I 2-winged below the tip . . . . . . 1. E. MURICATA.
Glume I not or obscurely winged below the tip . . 2. E. ZEYLANICA.

1. **E. muricata,** *Hack. Monogr. Androp.* 262 (1889).

*Ischæmum pectinatum*, Trin.; Thw. Enum. 365 (excl. syn.) and 436. C. P. 3848.

Fl. B. Ind. vii. 140.

Stems 6–8 in., ascending from a woody, creeping rootstock, slender, strongly compressed, smooth, shining; l. 3–12 by $\frac{1}{8}$–$\frac{1}{6}$ in., thinly coriaceous, smooth on both surfaces and on the margins, striate, midrib and few veins very slender, sheaths of lower l. short, broad, equitant, of upper long, strongly compressed, mouth not auricled, ligule a very short eciliate membrane; spike up to 6 in. long, by $\frac{1}{5}$ in. across the pale yellowish shining spikelets, curved, rhachis undulate, internodes $\frac{1}{3}$–$\frac{1}{2}$ the length of the spikelets; glume I $\frac{1}{6}$ in. long,

orbicular-ovate, slightly convex, 5–7-veined, with a subquadrate wing on each side reaching beyond the acute tip, spines shorter than the glume is broad; pedicelled spikelet and pedicel reduced to a fusiform, compressed, inflated body as long as the sessile spikelet, acuminate at both ends, green on one face, which is flat, with anastomosing veins, convex on the other face, which is white, membranous, veinless, the green surface forming a keel at the meeting.

The nature of the organ representing the pedicel and glume of an upper spikelet is not clear to me, whether it is, as Hackel regards it, a mere pedicel sometimes terminated by a minute glume, or a glume I, with a white glume II, the margins of which are confluent with glume I all round.

Trincomalie (Glenie); Jaffna district; Pallavarayankaddu (Trimen).
South Deccan Peninsula, Australia.

2. **E. zeylanica,** *Hack. Monogr. Androp.* 263 (1889).
*Ischæmum falcatum*, Thw. Enum. 436. *I. zeylanicum*, Hack. MSS. ex Trim. Cat. 107. C. P. 3322.
Fl. B. Ind. vii. 140.

Stems 1–2 ft., erect or ascending from a hardened base, slender, compressed, smooth, shining; l. 3–12 by $\frac{1}{8}$–$\frac{1}{5}$ in., rather rigidly coriaceous, striate, veins very slender, flat or complicate, surfaces and margins smooth, sheaths of lower 1–3 in., strongly compressed, equitant, mouth not auricled, glabrous, ligule very short, membranous; spike 2–3 by $\frac{1}{8}$ in. across the spikelets, rhachis straight, internodes clavate, nearly as long as the spikelet or shorter; spikelets $\frac{1}{5}$ in. long; glume I flat, ovate or oval, subacute or obtuse, 5–7-veined, margined or very narrowly winged at the tip on each side, spines as long as the glume is broad or shorter; pedicelled spikelet as in *E. muricata*, but veins fewer, and with sometimes a subulate terminal glume.

South of the Island (Thwaites), Colombo, common (Ferguson), Uva Prov., near Nilligalle (Trimen).
Endemic.
First found by Mrs. Col. Walker.

35. **POGONATHERUM,** *Beauv.*

Very slender, perennial grasses; stem leafy upwards, branching; l. narrow, suberect; spikes solitary on long capillary flexuous peduncles, plumose from the ultra capillary flexuous awns, rhachis at length fragile, internodes short; spikelets very minute, subterete, 1–2-fld., binate, a bisexual sessile and pedicelled neuter male or very rarely bisexual, callus bearded with very long hairs; glumes 3 or 4, all membranous, hyaline, veins very obscure or 0, I oblong, truncate, dorsally rounded,

not keeled, II longer, ovate, keeled, bifid, awned in the sinus, awn much longer than the spikelet, sparingly twisted, III nearly as long as II, not awned, usually 0 in the pedicelled spikelet, IV about half as long as II, bifid, awned in the sinus, awn as in II, palea broadly oblong not keeled; lodicules 0; stam. 1 or 2; ov. narrow, styles short, free, stigmas very long, exserted at the tip of the spikelet, shortly hairy; grain narrow, gibbously obovate, compressed, acute.—Sp. 2 or 3; all in *Fl. B. Ind.*

**P. crinitum,** *Kunth, Enum. Pl.* i. 478 (1833).

*P. saccharoideum*, Thw. Enum. 365 (non Beauv.). *P. saccharoideum*, *β*, *monandrum*, Hack. Monogr. Androp. 193. *Andropogon crinitus*, Thunb.; Moon, Cat. 72. C. P. 936.

Fl. B. Ind. vii. 141. Kunth, Revis. Gram. t. 161 (*P. refractum*, Nees).

Stems 6–18 in., densely tufted; l. 1–3 by $\frac{1}{10}$–$\frac{1}{5}$ in., linear-lanceolate, acuminate, more or less hairy on bot h surfaces, and on the margins, sheaths lax, glabrous, mouth hairy, ligule of long hairs; spikes subpanicled, terminating the branches of the stem, on capillary peduncles $\frac{3}{4}$–1 in., long, reddish yellow, rhachis slender, internodes very short, ciliate, tips thickened, truncate; spikelets about $\frac{1}{14}$–$\frac{1}{12}$ in. long, usually monandrous, hairs of callus longer than the spikelets; glumes veinless, I ciliate at the rounded or retuse tip, II $\frac{1}{4}$ longer than I, keel and lobes scaberulous, the latter ciliolate, III linear, smooth, epaleate, or 0, IV cleft to the middle, lobes ciliolate, awns of II and IV straight or recurved, $\frac{1}{2}$–$\frac{3}{4}$ in. long, of IV rather the longest.

Very common, especially in the Central and Western Provinces.
Throughout India, China, Malaya, New Hebrides.

P. SACCHAROIDEUM, *Beauv. Agrost.* 56, t. 11, f. 7, is very doubtfully distinct from *crinitum*, and regarded by Hackel as a variety (*α*, *genuinus*). It is distinguished by its stouter habit, larger spikelets, short callus hairs, glume III oblong or ovate, ciliate, empty diandrous or rarely bisexual, paleate or not. Hackel gives Ceylon as a habitat. It is a very common Indian plant.

### 36. **APOCOPIS,** *Nees.*

Annual or perennial grasses; stems slender; l. narrow, flat; spikes solitary or 2–3-nate, compressed, rhachis firm, not readily disarticulating, internodes very short, slender, villous; spikelets secund, closely imbricate in 2 series, solitary, sessile, 1–2-fld., lowest 2–4 in the spike imperfect, neuter, callus very short, acute, bearing the long capillary ciliate pedicel of an absent upper spikelet; glumes 4, I very large, cuneately

obovate or obcordate, chartaceous below, membranous above, more or less villous with pale brown or yellow hairs, 7–9-veined below the apex, margins incurved at the base only, II as long as I, much narrower, membranous, oblong-ovate, truncate, 3-veined, sides broadly incurved, III and its hyaline palea oblong, tips broadly truncate and ciliolate, male or neuter, IV bisexual, linear, 2-toothed, 1-veined, hyaline, awned, awn short, very slender, twisted, palea half as long as the glume, quadrately oblong, veinless, truncate, tip ciliolate; lodicules 0; anth. linear; ov. narrow, stigmas slender, exserted at the tip of the spikelet; grain very small, narrowly oblong, embryo very large.—Sp. 3, all in *Fl. B. Ind.*

**A. Wightii**, *Nees ex Steud. Syn. Gram.* 377 (1854).
Thw. Enum. 365.
Fl. B. Ind. vii. 142.

Annual; stems 6–24 in., densely tufted, erect or ascending, simple or branched, leafy, glabrous; l. 2–4 by $\frac{1}{10}$–$\frac{1}{8}$ in., narrowly linear-lanceolate, acuminate, glabrous ciliate or sparsely hairy, margins scaberulous, midrib and veins slender, sheaths glabrous or hairy, of upper subventricose, mouth not auricled, ligule membranous, lacerate; spikelets $\frac{1}{8}$–$\frac{1}{5}$ in.; glume I dorsally convex, more or less villous or villous and tomentose, awn of IV $\frac{1}{2}$–$\frac{3}{4}$ in., pubescent, column twisted; anth. $\frac{1}{10}$ in. long; pedicel of absent spikelet shorter than the sessile; grain $\frac{1}{20}$ in.

There are two forms or varieties of this plant in Ceylon:—

*α*, **genuinus,** *Hack. Monogr. Androp.* 193. C. P. 400.

Spikelets $\frac{1}{5}$ in. long, glume I dorsally villous below, puberulous above, tip rounded or retuse, ciliolate.

*β*, **mangalurensis,** *Hack. l. c.* C. P. 3959.

Glume I obcordate, dorsally villous below, tomentose above, tip ciliate with long hairs. A. Beckettii, *Thw. ex Trim. Cat. Ceyl. Pl.* 107.

Var. *α*, Central Prov., alt. 3000–4000 ft. Galagama (Thwaites), Kaloopahana, Colombo (Ferguson). Var. *β*, Dambulla. Jaffna district, Punakar and Pallavarayankaddu (Trimen).

Central India, the Deccan Peninsula, Burma, China.

I find no difference in the length of the awns in the two varieties.

### 37. ARTHRAXON, *Beauv.*

Annual or perennial slender grasses; stem decumbent, creeping and branching below; l. short, broad, base cordate, sheaths shorter than the internodes; infl. of binate digitate or fascicled spikes, rhachis very slender, articulate, fragile; spikelets 1-fld., secund, sessile, solitary or with an imperfect pedicelled, laterally compressed, deciduous with the internode, callus bearded; glumes 4, I lanceolate or linear-lanceolate,

acute, thin or subcoriaceous, more or less muriculate or aculeate, margins hardly incurved, II narrower, lanceolate, acuminate, chartaceous, keeled, III hyaline, paleate, empty, IV hyaline, awned or mucronate, bisexual, awn dorsal, palea minute or 0; lodicules 2, cuneate or quadrate; stam. 1–3; styles short, stigmas laterally exserted; grain linear or narrowly fusiform.—Sp. 10; 9 in *Fl. B. Ind.*

Stam. 3, anth. as long as glume IV . . . 1. A. RUDIS.
Stam. 1–3, anth. much shorter than glume IV.
  Glume II aristiform in the upper third . . 2. A. MICROPHYLLUS.
  Glume II linear, acute . . . . . 3. A. CILIARIS.

1. **A. rudis,** *Hochst. in Flora*, xxxix. 188 (1856).
*Andropogon rudis*, Thw. Enum. 368. C. P. 866.
Fl. B. Ind. vii. 144.

Perennial; stem 1–3 ft., as thick as a crow-quill at the base, with ascending branches, terminal internodes very long; l. remote, 2–4 by $\frac{1}{2}$–$\frac{3}{4}$ in., lanceolate or ovate-lanceolate from a broad cordate base, acuminate, thin, glabrous or rarely hispidulous above, beneath glabrous, hispidulous or pubescent, margins and often midrib beneath scabrid, margins sometimes pectinately ciliate or spinulose, especially towards the base, midrib and 4 or more pairs of veins slender, sheaths glabrous hairy or strigose, mouth shortly auricled, ligule membranous, erose; infl. of 1–5, very unequal, naked, filiform, ciliate, flexuous peduncles, which bear 1–3 pedicelled spikes, $\frac{1}{4}$–1 in. long, rhachis of spikes very slender, fragile, internodes as long as the spikelets or shorter, ciliate; spikelets rather distant, $\frac{1}{7}$–$\frac{1}{5}$ in. long, ovoid or lanceolate, terete, callus very short, densely shortly bearded; glume I coriaceous, lanceolate, acuminate, convex, 7–9-veined, veins all or the submarginal only armed with spinescent tubercles throughout their length or chiefly upwards, III, IV and its palea hyaline, ciliate, keel of II scabrid or aculeolate, IV oblong, tip bifid, veins 2, median very slender, 3 below the insertion of the awn, which is subbasal and about as long as the spikelet, palea very short, ovate, tip toothed; anth. 3, $\frac{1}{10}$–$\frac{1}{8}$ in., linear.

Uva and Central Provinces; not uncommon.
Also in Assam and Silhet.

2. **A. microphyllus,** *Hochst. in Flora*, xxxix. 188 (1856).
*Andropogon lancifolius*, Trin.; Thw. Enum. 368. C. P. 3136.
Fl. B. Ind. vii. 147.

Annual; stem and branches filiform, 6–12 in. long, straggling, flexuous, glabrous or obscurely pubescent below the spikes; l. $\frac{3}{4}$–1 in., ovate or oval, acuminate, membranous,

sparsely setose above, more so beneath, margins smooth, glabrous or ciliate towards the base, midrib and veins obscure, sheaths short, membranous, of uppermost l. ventricose, mouth not auricled, ligule short, hyaline, ciliate; spikes 3–5, sessile or very shortly peduncled, rhachis capillary, internodes shorter than the sessile spikelets, ciliate with very long erect hairs; spikelets solitary, or with rarely a pedicelled, $\frac{1}{10}$–$\frac{1}{8}$ in., very narrowly lanceolate, callus short, obconic, bearded, white; glume I membranous, almost hyaline, lanceolate, bicuspidate, 5–7-veined above the middle, veins scabrid, II membranous, lanceolate, aristiform in the upper third, 1-veined, keel and awn scabrid, III very small, ovate, acuminate, epaleate, IV half as long as II, lanceolate, awned dorsally towards the base, eciliate, awn $\frac{1}{4}$ in. long, palea 0; anth. 2, minute, short; style and stigmas short; pedicelled spikelets if present $\frac{1}{15}$ in. long, ovate-lanceolate, acute, neuter, pedicel = $\frac{1}{4}$–$\frac{1}{3}$ of the sessile spikelet, ciliate with very long hairs, glume I ovate, acute, veins 5–7, scaberulous above the middle, II ovate, acuminate, III and IV minute, narrow, awn 0; grain linear.

Uva Province, Badulla district (Thwaites).

Himalaya, Khasia and Nilgiri Hills, Burma, Tonkin, Afr. trop.

The Ceylon specimens differ from the Indian in the almost glabrous stem below the spikes, and entire glume IV.

3. **A. ciliaris,** *Beauv. Agrost.* iii. (1812).

Hack. Monogr. Androp. 352, subsp. *Quartinianus.*

Fl. B. Ind. vii. 145 (not then known for Ceylon). Beauv. l. c. t. xi. f. 6.

Stems 1–2 ft., slender, branches long, glabrous below the spikes, and nodes pubescent; l. 1–1$\frac{1}{2}$ in., ovate-lanceolate, acuminate, thin, glabrous on both surfaces, margins smooth, ciliate towards the base, midrib and veins obscure, sheaths membranous, smooth, uppermost elongate, ventricose, mouth not auricled; spikes many, $\frac{1}{2}$–1 in., sessile and very shortly peduncled, rhachis capillary, internodes half as long as the spikelets, rather shortly ciliate; spikelets solitary, $\frac{1}{10}$–$\frac{1}{8}$ in., narrowly lanceolate, terete, callus glabrous or nearly so; glumes I and II punctulate, I chartaceous, lanceolate, acuminate, veins 7–9, vanishing downwards from the middle, minutely aculeolate, II as long as I, linear, acute, 3-veined and thickened in the middle, margins broad, incurved, hyaline, keel more or less aculeolate, III not half I, ovate, acuminate, veins 0, IV as long as III, lanceolate, awn subbasal about $\frac{1}{6}$ in., palea 0; lodicules quadrate; stam. 1 or 2, anth. minute, short; styles and stigmas short; pedicel of absent upper spikelet about half as long as the sessile spikelet, ciliate like the internodes; grain linear.

Central Province. Hatale, Madulkelle (Trimen).

All India, Burma, the Caucasus, Java, China, Japan, Australia.

A common and very variable plant in India, of which Hackel has described 5 subspecies and 9 varieties, with the description of none of which do the Ceylon specimens quite agree. The characters I have given, being drawn from only 2 Ceylon specimens in Herb. Peraden., will, no doubt, require modification when more are known.

### 38. **APLUDA,** *L.*

A tall, slender, perennial, leafy grass; stems erect, or subscandent, branching; l. narrow, flat, more or less petioled; infl. panicled, leafy, of many small spikes, each in a spathiform bract; spikes deformed, base rounded, often utricular, bearing in front a sessile bisexual spikelet, prolonged above the base into two flat, linear, truncate, parallel arms, one terminated by a solitary minute glume, the other by the upper spikelet; glumes of both spikelets 4, I and II empty, III and IV delicately membranous; glume I of lower spikelet longest, anticous, linear-oblong, coriaceous, rigid, II thinner, tumid, beaked, dorsally gibbous, 7-veined, III oblong, acute, 3-veined, triandrous or neuter, IV short, quadrate, deeply bifid, awned in the sinus, fem. or bisexual, palea of III linear, 2-veined, of IV minute, ovate; styles short, free, stigmas short, penicillate; upper spikelet dorsally compressed, glume I oblong, acute, many-veined, herbaceous, margins narrowly incurved, II chartaceous, ovate-lanceolate, acuminate, 3-veined, III and IV oblong, 1-veined, III triandrous, IV fem. or imperfectly bisexual, paleas of III and IV as in the lower spikelet; lodicules of all fl. 2, cuneate; anth. linear; grain oblong, subcompressed, embryo large.—Monotypic.

A most difficult grass to describe intelligibly. Hackel regards the swollen hollow base of the spike as the callus of the lower spikelet, in which view I, supported by Dr. Stapf, do not concur.

**A. varia,** *Hack. Monogr. Androp.* 196 (1889).

*A. aristata*, Linn.; Thw. Enum. 364. C. P. 59, 3165, 3166.

Fl. B. Ind. vii. 150 (var. *aristata*). Lamk. Ill. t. 841, f. 1 (*A. aristata*). Beauv. Agrost. t. 23, f. 5 (*A. Gryllus*).

Stem densely tufted, geniculately ascending, 1–6 ft. high, erect or branches rambling amongst bushes, stout or slender, sometimes as thick as a goose-quill below, smooth, polished, internodes very long, solid; l. 4–18 by $\frac{1}{10}$–$\frac{2}{3}$ in., narrowed from the middle to a filiform tip, and below it into a long or short slender petiole, flaccid, flat, scaberulous on both surfaces,

margins scabrid, midrib slender, pale, sheaths long, smooth, mouth not auricled, ligule chartaceous, oblong, lacerate; infl. very variable, of spikelets clustered on short peduncles, which clusters are solitary, or few, or very numerous and arranged in elongate bracteate very contracted interrupted leafing panicles, rhachis of infl. slender, glabrous or slightly scabrid; bracts of spikelets $\frac{1}{8}$–$\frac{1}{3}$ in. long, sessile or pedicelled, cymbiform, green, striate, tip aristulate, rarely long-awned or with a short green limb; spikes longer or shorter than the bracts, base rounded, suddenly contracted into a slender pedicel, base of spike sometimes forming a large thin-walled utricle, arms subfalcate, thinly coriaceous, glabrous or ciliate above; sessile spikelet with the gibbous back of glume II placed between the arms, its sides not incurved, its beak scabrid; glume I of sessile spikelet spreading, strict or recurved, bicuspidate, margins hyaline, glume IV of the same 3–5-veined below the sinus, the lateral veins arching and meeting the median at the insertion of the awn, column of awn twisted, palea ovate, obtuse, wrapped round the ov., veins 2, very short, or 0.

Abundant up to 4000 ft. elevation. Fl. July.

All India, and eastward to the Pacific Islands.

Hackel divides the forms of this protean plant into two principal subspecies: one, *A. mutica*, Linn., which is rarely awned; the other, *A. aristata*, Linn., with awned glume IV of the sessile spikelet, to which all the Ceylon specimens are referable, though both are so common in India that *mutica* will probably be found in the Island. Of *aristata* Hackel has 4 varieties, to the first of which, *aristata proper*, the Ceylon specimens are referable; the others have more or less hairy bracts or glumes, or both, and further differ in the size of the utricular base of the spike and other characters. No fewer than 15 names have been given to forms of this grass.

### 39. **ANDROPOGON,** *L.*

Grasses of various habit; l. usually narrow; infl. of solitary, binate, digitate, fascicled, or panicled spikes, which are in subgen. *Chrysopogon* sometimes reduced to 3 spikelets, rhachis articulate, more or less fragile; spikelets in alternate pairs, a sessile bisexual, and a pedicelled male or neuter, one or more lowest in the spike sometimes neuter and differing in form from the upper; sessile spikelets 1-fld., callus long or short; glumes 3 or 4, I coriaceous or chartaceous, 2-keeled, awn 0, II thinner, concave, keeled, rarely shortly awned, III hyaline or 0, neuter, IV hyaline, awned, often reduced to the dilated base of the awn, bisexual,

palea small or 0; lodicules 2, cuneate; stam. 3–1; stigmas laterally exserted; pedicelled spikelets usually smaller than the sessile; grain various.—Sp. about 200; 78 in *Fl. B. Ind.*

The heterogeneous collection of grasses brought together by Hackel under *Andropogon* have been classified by that able systematist under 11 subgenera, of which 8 are Sinhalese, and are indicated below. Of these, *Sorghum*, *Chrysopogon*, *Heteropogon*, and *Cymbopogon* are considered to be genera by various earlier authors, and may, in Dr. Stapf's and my opinion, be eventually adopted as such. In this work I have arranged the Sinhalese subgenera somewhat differently from Hackel (as adopted in the Flora of B. India), taking the cupular character *versus* the truncate of the articulations of the internodes of the spike as a fairly constant primary character.

KEY TO THE SUBGENERA OF *ANDROPOGON*.

Internodes of spike truncate at the top, not cupped.
  Isozygi. Sessile spikelets all similar.
    Spikes of many spikelets.
      Internodes of spikes flattened with a diaphanous centre and thickened margins . 1. AMPHILOPHIS.
      Internodes of spikes terete or angular with no diaphanous centre. Sessile spikelets dorsally compressed . . . . . 2. SORGHUM.
      Internodes of spikes laterally compressed . 3. VETIVERIA.
    Spikes of 3 spikelets . . . . . . 4. CHRYSOPOGON.
  Heterozygi. Lower sessile spikelets of the spike dissimilar from the upper sessile, mostly neuter.
    Spikes 2 or more, digitate or panicled . . 5. DICHANTHIUM.
    Spikes solitary . . . . . . . 6. HETEROPOGON.
Internodes of spikes deeply cupped at the top. (See also *A. polyptichus*.)
  Spikes solitary, no spathaceous bracts . . 7. SCHIZACHYRIUM.
  Spikes binate, each pair with a spathaceous bract 8. CYMBOPOGON.

KEY TO THE SPECIES OF *ANDROPOGON*.

Subgen. 1. **Amphilophis.**
  Spikes digitate or fasicled, not panicled.
    Spikes 4–6 in., glume I not pitted . . 1. A. PSEUDISCHÆMUM.
    Spikes 1–2 in., glume I pitted . . . 2. A. PERTUSUS.
  Spikes panicled . . . . . . . 3. A. INTERMEDIUS.
Subgen. 2. **Sorghum.**
  Spikelets silky with usually pale hairs . . 4. A. HALEPENSIS.
  Spikelets villous with purple hairs . . 5. A. SERRATUS.
Subgen. 3. **Vitiveria.**
  Glume I with muricate sides . . . 6. A. SQUARROSUS.
  Glume I smooth . . . . . . . 7. A. VENUSTUS.
Subgen. 4. **Chrysopogon.**
  Pedicel of upper spikelet ½ or more longer than the sessile spikelets.
    Pedicel of upper spikelet glabrous . . 8. A. ACICULATUS.
    Pedicel of upper spikelet villous . . 9. A. ZEYLANICUS.
  Pedicel of upper spikelet not ½ as long as the sessile spikelet . . . . . 10. A. MONTICOLA.

Subgen. 5. **Dichanthium.**
Glume IV of sessile spikelet reduced to an awn . . . . . . . . . 11. A. CARICOSUS.
Glume IV of sessile spikelet 2-fid, awned in the sinus . . . . . . . . 12. A. POLYPTYCHUS.
Subgen. 6. **Heteropogon.**
Spikes $\frac{1}{2}$–3 in., glume I flat . . . . . 13. A. CONTORTUS.
Spikes 3–6 in., glume I deeply channelled . 14. A. TRITICEUS.
Subgen. 7. **Schizachyrium** . . . . 15. A. HIRTIFLORUS.
Subgen. 8. **Cymbopogon.**
Column of awn glabrous or nearly so.
Ped. of spikes shorter than the proper bracts.
Panicle large, compound, spikelets $\frac{1}{7}$–$\frac{1}{5}$ in.
Leaf-base broad, cordate . . . 16. A. SCHŒNANTHUS.
Leaf-base narrow, not cordate . . 17. A. NARDUS.
Panicle narrow, spikelets $\frac{1}{5}$–$\frac{1}{3}$ in. . . 18. A. THWAITESII.
Ped. of spikes longer than the proper bracts 19. A. LIVIDUS.
Column of awn hirsute . . . . . . 20. A. FILIPENDULUS.

1. **A. Pseudischæmum,** *Nees ex Steud. Syn. Gram.* 380 (1854).
*A. scandens*, Thw. Enum. 368, non Roxb. *A. oryzetorum*, Hack. Monogr. Androp. 477. C. P. 3258.
Fl. B. Ind. vii. 172.

Perennial; stems 1–2 ft., tufted, erect, slender, leafy, simple or branched, sometimes fasciculately, the branches all flowering, nodes glabrous, upper internodes filiform; l. 6–10 in., almost filiform or up to $\frac{1}{10}$ in. broad, linear, finely acuminate, smooth, dark glaucous-green, midrib pale, base narrow, sheaths slender, terete, smooth, mouth with rounded membranous auricles, ligule a narrow membrane; spikes 4–6, subdigitately fascicled, slender, erect, sessile or shortly peduncled, reddish, rhachis filiform, fragile, ciliate; sessile spikelets fem. or bisexual, twice as long as the internodes or less, $\frac{1}{7}$–$\frac{1}{6}$ in. long, lanceolate, subacute, callus short, shortly bearded; glume I thin, about 7-veined, dorsally hairy below the middle, margins narrowly incurved, rigidly ciliate above the middle, II lanceolate, acute, ciliate, 3-veined, III much shorter, narrowly oblong, ciliate, veins 0, IV the flattened membraneous base of the capillary awn, which is about twice as long as the spikelet; pedicelled spikelets narrower and more oblong than the sessile, with no glume IV, pedicel ciliate.

Hot drier parts of the Island, especially on margins of rice-fields (Thwaites).

The Deccan Peninsula.

Hackel distinguishes Thwaites's Ceylon plant under the name of *A. oryzetorum* from *A. Pseudischæmum*, Nees, by the long bearded nodes, leaves scabrid on both surfaces, longer ligule and other minor characters. These, however, do not hold in the Peradeniya Herb. specimens, in which the nodes of the stem are perfectly naked, the leaves only faintly scaberulous, and the ligule short.

Mr. Ferguson says of this grass (Gram. Indig. to Ceylon, 35): 'I found

what agrees with C. P. 3258 on banks of the Haragam river, in company with *A. halepensis*, and it is now growing very luxuriantly and in full flower in my garden in Colombo. The young culms are from 6–8 ft. high.' This is so remarkable a development under cultivation of a plant described in its native state as only 1–2 ft. high, that the statement requires confirmation.

2. **A. pertusus,** *Willd. Sp. Pl.* iv. 922 (1805).
Thw. Enum. 367, partim, 437. Hack. Monogr. Androp. 479. C. P. 951. Fl. B. Ind. vii. 173. Beauv. Agrost. t. 23, f. 2.

Annual (?), stem 1–2 ft., erect or ascending, slender, leafy upwards, simple or sparingly branched, nodes bearded with spreading hairs, upper internodes filiform; l. narrow, lower often short and crowded at the base of the stem, all narrowly linear, up to a foot long and $\frac{1}{6}$ in. broad, flat, tips of upper capillary, glabrous or sparsely ciliate, margin scaberulous, base narrow, rounded, upper sheaths long but shorter than the internodes, terete, lower shorter, compressed, mouth hardly auricled, ligule a short ciliolate membrane; spikes 3–10, subdigitately racemed, sessile or lower shortly peduncled, 1–2 in. long, slender, suberect, flexuous, rhachis filiform, fragile, and pedicels villous with white hairs; spikelets $\frac{1}{7}$ in. long, longer than the internodes, oblong-lanceolate, pale, callus villously bearded with long hairs; sessile spikelet fem., glume I obtuse or minutely truncate, thinly chartaceous, with a large deep pit about the middle, 5–9-veined, sparsely hairy towards the base, margins narrowly incurved, subspinulosely ciliate, II lanceolate, acuminate, tip exserted beyond I, obscurely keeled above the middle, glabrous or ciliate, 3-veined, III shorter, linear-oblong, obtuse, veinless, IV the narrowed colourless base of the slender subgeniculate awn, which is $\frac{1}{2}$–$\frac{2}{3}$ in. long, and slightly rough, palea, 0; pedicelled spikelets like the fem. but narrower, pedicel more than half as long as the sessile spikelet, glume I acute, very rarely pitted, III ciliate, IV 0, anth. linear.

Very common, from the sea to 3000 ft. elevation.

All warm countries of the old world, extending to the Mediterranean.

A variable plant, of which Hackel in his Monogr. Androp. has nine varieties, referring the Ceylon plant to *a genuinus.* The characteristic deep pit on glume I of the sessile (rarely of the pedicelled) spikelet is sometimes absent, but very rarely; two of these pits occur in some Indian forms.

An excellent fodder grass, green or dry (Ferguson).

3. **A. intermedius,** *Br. Prod.* 20 (1810).
Hack. Monog. Androp. 485. *A. fascicularis*, Thw. Enum. 437, non Roxb. C. P. 411.
Fl. B. Ind. vii. 175.

Perennial; stem 2–3 ft., stout, erect, subcompressed, simple or sparingly branched, leafy upwards, nodes glabrous; l. 6–18

by $\frac{1}{6}$–$\frac{1}{4}$ in., narrowly linear, tips capillary, rather coriaceous, keeled, glaucous, glabrous or ciliate towards the narrow base, smooth on both surfaces, margins slightly scaberulous, sheaths glabrous, mouth not auricled, ligule a very short ciliate membrane; panicle 4–6 in., erect, contracted, rhachis slender, smooth, branches $\frac{1}{2}$–$1\frac{1}{2}$ in. long, lower whorled, upper alt., branchlets or spikes up to 1 in., erect, slender, rhachis capillary, fragile, smooth; sessile spikelets $\frac{1}{7}$ in long, longer than the internodes, linear-oblong, pale, callus very short, bearded; glume I thin, obtuse, 4–9-veined, dorsally smooth, margins narrowly incurved, rigidly ciliate above the middle, II as long as I, oblong-lanceolate, acute, veins 0 or 3 faint, smooth, eciliate, III much shorter, oblong, obtuse, veinless, eciliate, IV the slender colourless base of the capillary geniculate awn, which is about twice as long as the spikelet, column minutely roughened; pedicelled spikelet rather smaller and narrower than the sessile, pedicel more than half as long as the latter, slender, glabrous or ciliate.

Hot drier parts of the Island (*Thwaites*).

Throughout Trop. Asia and Africa, Australia and the Pacific, also in the Caucasus.

There is only one sheet of this in the Peradeniya Herbarium, with the habitat between Haputale and Badulla. *A. intermedia* is a variable plant in India. Hackel has four varieties of it, and refers the Ceylon plant to var. *Hænkei*, distinguished by its compound panicle 5–6 in. long, with the branches bearing 4–8 spikes, the sessile spikelets $\frac{1}{8}$ in. long, glume I rarely pitted and its margins rigidly ciliolate. The variety *punctatus* (*A. punctatus*, Trin.) which is common in India has not hitherto been found in Ceylon; if found, care must be taken not to confound it with *A. pertusus*.

4. **A. halepensis,** *Brot. Fl. Lusit.* i. 89 (1804).

Thw. Enum. 366. *A. Sorghum*, subsp. *halepensis*, Hack. Monogr. Androp. 501. C. P. 2484.

Fl. B. Ind. vii. 182. Reichb. Ic. Fl. Germ. t. 54 (*Sorghum halepense*). Host, Gram. Austriac. (*Holcus halepensis*).

Perennial; stem tall, up to 10 ft. and more, stout, simple or sparingly branched, glabrous, leafy; l. 1–2 ft. by 1–2 in., narrowly lanceolate, tapering to an acuminate tip and narrowed base, flat, glabrous, smooth on both surfaces, margins scabridly serrulate, midrib stout, sheaths glabrous, white with a waxy secretion at the base, mouth not auricled, ligule short, membranous, ciliolate; panicle 6–18 in., pyramidal, decompound, rhachis nearly smooth, branches mostly alt., suberect, filiform, lower up to 6 in. long, axils often bearded, branchlets capillary; spikes $\frac{1}{2}$–1 in., linear, internodes 3–7 and pedicels glabrous or ciliate; sessile spikelets $\frac{1}{6}$–$\frac{1}{5}$ in, oval- or ovate-lanceolate, subacute, dorsally compressed, green, callus very

short, sparsely bearded; glume I convex, ovate or oblong, 5–11-veined, silkily hairy, margins involute, II chartaceous, ovate-lanceolate, acuminate, 5–7-veined, ciliate, III oblong, acute, hyaline, 1-veined, ciliate, IV smaller, oblong or ovate, eciliate, veins 0, awns 0 (in Ceylon); lodicules ciliate; anth. linear; ov. subglobose, styles and stigmas short; pedicelled spikelets narrower than the sessile, glume I glabrous, 5–9-veined, margins strongly ciliate, II–IV much as in the sessile, pedicel shorter or as long as the sessile; grain obovate or obovate-oblong.

Central Province, not uncommon (*Thwaites*).

Moist warm countries.

The Ceylon plant is awnless in all the specimens I have seen.

A. SORGHUM, *Brot.*, **Karal-iringu,** *S.*, known as Sorgho, Imphee, Indian Millet, Jowar, Chinese Sugar-cane, and other names, is cultivated under various forms throughout the Tropics, but apparently rarely in Ceylon, for its grain, and as a fodder grass. It is a tall very robust annual, sometimes 20 ft. high, with a large usually drooping head, of often globose, pale, or dark spikelets. It has been supposed to be a cultivated state of *A. halepensis*, of very early unknown origin. There is a specimen of it in the Peradeniya Herbarium, labelled '196, Truuka, or Talai-virichehán; Mannar (Crawfurd).' It is the 'Durra' of Tropical Africa.

5. **A. serratus,** *Thunb. Fl. Jap.* 41 (1784).

Hack. Monogr. Androp. 520. *A. tropicus*, Spreng.; Thw. Enum. 366. *Sorghum fulvum*, Beauv.; Trim. Cat. 108. C. P. 419.

Fl. B. Ind. vii. 185.

Perennial; stems 3–4 ft., erect, slender or rather stout, glabrous, nodes bearded; l. 6–18 by $\frac{1}{6}$–$\frac{1}{2}$ in., narrowed from the middle to the finely acuminate tip and contracted base, rigid, glabrous or sparsely hairy, surfaces slightly scaberulous, margins scabrid, sheaths glabrous or often villously silky, mouth with villous auricles, ligule obtuse or truncate; panicle 4–12 in., oblong, rhachis slender, contracted, branches suberect, capillary, lower whorled up to 2 in. long, all bearing, at their tips only, solitary short spikes; rhachis of spike and pedicels of upper spikelet longer or shorter than the sessile spikelet, very slender, smooth or strigosely hairy; spikelets 2–8 in a spike, ovoid, $\frac{1}{7}$–$\frac{1}{6}$ in. long, dorsally slightly compressed, callus short, bearded with rufous hairs; glume I of sessile spikelets coriaceous, ovate, tip membranous, obtuse or 2-toothed, convex, dark red-brown and polished in the centre, margins narrowly incurved, rufously ciliate, II–IV ciliate, II oblong-ovate or lanceolate, acuminate, 1-veined, hardly keeled, III narrower, IV very short, entire or bifid, awned or not in the sinus, awn slender, up to $\frac{1}{5}$ in. long; lodicules short, broad, ciliate; styles and stigmas short, pedicelled spikelets subsimilar, male, glume I 7-veined, IV not awned; grain ovoid-oblong, compressed.

Uva Province; Badulla (*Thwaites*), Ella Pass and Passava (*Trimen*). Trop. Asia and Australia.

Hackel refers the Ceylon plant of Thwaites to his var. *nitidus*, distinguished by the entire and awnless glume IV of the sessile spikelet; but I find this glume to be more often bifid and sometimes awned.

6. **A. squarrosus,** *Linn. fil. Suppl.* 433 (1781). **Sæwandara,** *S.* **Vettivera,** *T.*

Hack. Monogr. Androp. 542. *A. muricatus*, Retz.; Thw. Enum. 368. Moon, Cat. 72. C. P. 871.

Fl. B. Ind. vii. 186.

Rootstock branched, densely tufted, furnished with long spongy, aromatic, brown root-fibres; stems 2–3 ft. high, stout, erect, leafy, as thick as a goose-quill at the base, smooth, hard, polished, solid; l. 1–2 ft. by $\frac{1}{3}$–$\frac{3}{4}$ in., sub-bifarious, erect, narrowly linear, firmly acuminate, flat, strongly keeled towards the base, smooth, margins usually scaberulous, sheaths coriaceous, glabrous, not auricled, ligule a ridge of minute hairs; panicle 4–12 in., erect, narrowly thyrsiform, of fascicled, suberect, slender, strict, articulate spikes 2–3 in. long, rhachis of panicle strict, smooth or scaberulous, of spikes filiform, internodes shorter than the spikelets, scaberulous; sessile spikelet $\frac{1}{6}$ in., callus shortly bearded; glume I ovate, obtuse, concave, thickly coriaceous, margins incurved, rounded keel and sides aculeolate, veins obscure, II as long, oblong, acuminate, concave, coriaceous, margins hyaline, ciliolate, keel aculeolate, III linear-oblong, hyaline, ciliolate, veins 0, IV shorter, linear, tip obtuse or retuse, aristulate, glabrous, 1-veined, palea ovate-lanceolate; lodicules very minute, broadly quadrate, many-veined, connate; styles and stigmas short; pedicelled spikelet oblong-lanceolate, pedicel as long as the internode, scaberulous, tip bearded, glume I 3–5-veined, margins and sometimes rounded keel scabrid, II ovate-lanceolate, acuminate, 3-veined, IV oblong, ciliolate, palea linear-oblong, obtuse; lodicules cuneate, anth. linear.

Hotter parts of the Island (Thwaites). Common, but not truly wild; I have obtained it at 2000 ft. (Ferguson).

Plain and lower hills of India, Burma, Malaya, Trop. Africa.

The Khus-khus, much used for screens (tatties) to exclude the heat in India, also for thatching. The roots yield a fragrant otto. The African form has a well-developed awn to glume IV of the fem. spikelets. The spinules on glume I and II vary greatly in number and length.

7. **A. venustus,** *Thw. Enum.* 367 (1864).

Hack. Monogr. Androp. 545. C. P. 2875.

Fl. B. Ind. vii. 178.

Perennial; stem tall, stout, erect, as thick as a goose-quill below, compressed, smooth, polished; l. 12–16 by $\frac{1}{10}$–$\frac{1}{4}$ in., strict, rigid, erect, smooth, convolute, filiform and finely

acuminate above, narrowed below and rounded or produced into a long, stiff, trigonous, smooth petiole, margins scabrid, keeled by the strong, smooth midrib, sheaths subcompressed, rigid, keel rounded, basal more or less silkily tomentose, mouth auricled, villous, ligule lunate, villous; panicle 12–16 in., decompound, narrow, rhachis very slender, smooth, flexuous, branches and branchlets (spikes) capillary, terete, flexuous, quite smooth; spikes fragile, of few distant pairs of spikelets, internodes $\frac{1}{8}$–$\frac{1}{5}$ in.; sessile spikelets $\frac{1}{5}$ in., narrowly lanceolate, fem., callus small, stellately bearded with white hairs; glume I chartaceous, lanceolate, acuminate, tip 2-toothed, glabrous, margins narrowly incurved, keels scabrid above the middle, veins 2 at the flexures, II chartaceous, lanceolate, acuminate or aristulate, 1–3-veined above the middle, keel scabrid, III much shorter, ovate-lanceolate, embracing the ov., IV linear, 2-toothed, awned in the sinus, palea 0, awn about $\frac{1}{3}$ in., capillary, scaberulous; lodicules large, quadrate; ov. linear, styles short, stout, stigmas very narrow; pedicelled spikelets as long as the sessile but narrower, pedicel $\frac{1}{3}$–$\frac{1}{2}$ as long as the internode, callus very shortly bearded; glume I 3–7-veined, II aristulate, keel smooth, III as long as I, oblong-lanceolate, aristulate, 1-veined, IV entire or tip bifid, awn imperfect; anth. $\frac{1}{12}$ in.

Central Province, alt. 4000 ft., Ramboda, Kurunegalle, Ambagamuwa, Bopatelende, Dimbula, N. Eliya.

Endemic.

It is singular that this fine grass, which appears to be common at no great elevation in Ceylon, should not have been found in Continental India. It is intermediate in characters between the subgenera *Amphilophis* and *Vetiveria*, having the habit of the former. What is described here, and by Hackel, as glume III, is perhaps a palea of glume IV.

8. **A. aciculatus,** *Retz. Obs.* v. 22 (1783). **Tuttari,** *S.*

Hack. Monogr. Androp. 562. *Chrysopogon aciculatus*, Trin.; Thw. Enum. 366. *C. acicularis*, Moon, Cat. 72. C. P. 917.

Fl. B. Ind. vii. 188. Trin. Sp. Gram. Ic. t. 8, 9 (*Rhapis trivalvis*). Rheede, Hort. Mal. xii. t. 43.

Rootstock woody, creeping; stems erect or ascending, 1–2 ft., leafy chiefly at the base, lower internodes very short, upper elongate, slender, strict; l. densely tufted, 1–5 by $\frac{1}{8}$–$\frac{1}{5}$ in., linear, obtuse or acute, flat, often undulate, glabrous, rarely hairy beneath, glaucous, smooth, margins spinulose, midrib slender, sheaths not auricled, lower short, upper elongate, mouth more or less hairy, ligule a very short membrane; panicle 1–3 in., narrowly oblong, pale green or purplish, rhachis strict, filiform, branches short, spreading, at length erect, capillary, bearing few spikelets; sessile spikelets $\frac{1}{8}$–$\frac{1}{7}$ in.,

dorsally compressed, callus elongate, decurrent on the peduncle and with it shortly laterally fulvously bearded; glume I chartaceous, narrowed from above the broad base to the truncate tip, dorsally convex, aculeolate towards the tip, glabrous, smooth, veins 2–3, obscure, II as long, lanceolate, acuminate or aristulate, laterally compressed, keel setosely ciliate, III shorter, linear-oblong, acute or obtuse, retrorsely ciliate, IV narrow, hyaline, eciliate, awn terminal, scabrid, not twisted, about as long as the spikelet; lodicules minute, cuneate; styles and stigmas short; pedicelled spikelets $\frac{1}{5}$ in., pedicels compressed, nearly as long as the sessile spikelets, sparsely pubescent below the spikelet, glume I thin, lanceolate, acuminate, dorsally convex, 3-veined, keels ciliate towards the tip, II membranous, dorsally convex, 3-veined, III hyaline, oblong, acuminate, veinless, IV smaller, broader, 3-veined, paleate, II, III, and IV all retrorsely ciliate, palea of IV short, linear, oblong, obtuse, eciliate; anth. $\frac{1}{18}$ in.

Hotter parts of the Island; abundant in open places. A very troublesome grass, in the damp zone, up to 4000 ft. (Ferguson).

Plains and lower hills of India, Nicobar Islds., Trop. Asia, Australia, and Polynesia.

9. **A. zeylanicus,** *Nees ex Steud. Syn. Gram.* 397 (1854).

*A. nodulibarbis*, Hochst.; Hack. Monogr. Androp. 553. *Chrysopogon Wightianus*, Thw. Enum. 366, excl. var. β (non Nees). *C. zeylanicus*, Thw. l. c. *Rhaphis zeylanica*, Nees ex Steud. l. c. C. P. 996, 3248.

Fl. B. Ind.

Perennial; stems densely tufted, 1–3 ft., stout or slender, erect, simple or branched, leafy chiefly at the base, uppermost internodes usually very long and slender; l. 6–16 by $\frac{1}{10}$–$\frac{1}{6}$ in., linear, flat complicate or convolute, tip narrowed obtuse or acute, coriaceous, rigid, glabrous or laxly hairy on both surfaces, hairs often tubercle-based, margins scabrid, midrib and veins very prominent beneath, sheaths compressed, of lower l. short, broad, flattened, keeled, equitant, of upper narrow, mouth not auricled, ligule of very long hairs; panicle 5–8 in., ovate-oblong, lax, rhachis slender, smooth or nearly so, branches whorled, $\frac{1}{2}$–$1\frac{1}{2}$ in., capillary, flexuous, simple or again branched, tips bearded terminated by 1–3 sessile spikelets with their attached pedicelled; sessile spikelets $\frac{4}{10}$ in., narrowly oblong, callus long, rufously bearded laterally; glume I linear, coriaceous, dorsally rounded and hispidly scabrid above, II narrow, sides complicate, tip bifid with a short scabrid awn, III shorter, oblong, obtuse, retrorsely hyaline, ciliate, IV very narrow, linear, tip 2-lobed, awn about 1 in., hispidulous, forming a stout midrib which narrows downwards to the base of the glume, palea 0;

style and stigmas short; pedicelled spikelets $\frac{1}{2}$ in., pedicel rather shorter than the sessile spikelet, margins shortly ciliate, callus glabrous; glume I thin, very narrowly lanceolate, aristulate, 5-veined, II and III copiously ciliate with very long hairs, II lanceolate, finely acuminate, 3-veined, III narrowly oblong, obtuse, IV linear-oblong, obtuse; anth. $\frac{1}{7}$ in.

Not uncommon up to 6000 ft. elev. (Walker, &c.).
Also in the Nilgiri Hills.

10. **A. monticola,** *Schult. Mant.* iii. 665 (1827).
Hack. Monogr. Androp. 557. *Chrysopogon montanus*, Trin.; Trim. Cat. Ceyl. Pl. 108. *C. Wightianus*, var. *leucanthus*, Thw. Enum. 366. C. P. 2954.
Fl. B. Ind. vii. 192. Trin. Sp. Gram. Ic. t. 331 (*Chrysopogon serrulatus*).

Perennial; stems densely tufted, 1–4 ft., erect, stout or slender, simple or branched, leafy chiefly at the base, uppermost internodes usually very long and slender; l. 2–18 by $\frac{1}{8}$–$\frac{1}{4}$ in., erect, linear, acute, flat, rigid, glaucous, glabrous, smooth or scaberulous, margins scabrid, midrib slender, sheaths glabrous scabrid or hirsute, upper terete, lower compressed, equitant, mouth not auricled, ligule of short hairs; panicle 2–5 in., ovate or oblong, rhachis slender, flexuous, smooth or scaberulous, branches 1–2 in., whorled, capillary, flexuous, spreading, at length erect, tips bearded with spreading bristles; spikes reduced to a single sessile fem., with two pedicelled male spikelets; sessile spikelet $\frac{1}{6}$–$\frac{1}{4}$ in., laterally compressed, callus long, bearded on one side with long rufous bristles; glumes I and II with complicate sides, chartaceous, I linear, 2-toothed, 4-veined, keel and tip scaberulous, margins hyaline, II much broader and rather longer, falcate, 3-veined, tip 2-toothed, awned, awn capillary, keel glabrous or ciliate with long or short rufous bristles, margins broadly hyaline, III oblong, obtuse, ciliate with long flexuous hairs, IV very narrow, 2-lobed, eciliate, awned, awn $\frac{1}{2}$–1 in.; lodicules minute; ov. minute, stigmas slender; pedicelled spikelets as long as the sessile, very shortly pedicelled, dorsally compressed, callus very short, bearded with long rufous hairs, glume I lanceolate, acute or awned, 7-veined, scaberulous, II lanceolate, acuminate, 3-veined, III and IV smaller, oblong, acute, hyaline, ciliate; anth. $\frac{1}{8}$ in. long.

Hotter parts of the Island. Uma Oya, Matelle E., Dambulla, Nilgala, Jaffna district.

Hilly districts throughout India, Burma, Afghanistan, S. Africa.

I cannot distinguish in the Ceylon specimens between *monticola* proper, with long flexuous bristles on the keel of glume II of the sessile spikelets, and var. *Trinii*, with a glabrous or shortly ciliate keel. The colour and length of the hairs on the calli and sides of the pedicels of the male spikelets vary greatly.

There are in Herb. Peraden. small, very slender specimens, with very narrow leaves, from rocky places in the Jaffna district collected by Dr. Trimen.

11. **A. caricosus,** *Linn. Sp. Pl. Ed. II.* 1480 (1762).
Hack. Monogr. Androp. 567. *Heteropogon concinnus*, Thw. Enum. 368. C. P. 3556.
Fl. B. Ind. vii. 196. Trin. Sp. Gram. Ic. t. 329 (*A. serratus*, Retz.).

Stems erect or creeping below, forming tufts at the rooting nodes, very slender, 12–18 in. high, simple or branching upwards, internodes channelled on one side, upper filiform, nodes glabrous; l. 6–8 by $\frac{1}{10}$–$\frac{1}{6}$ in., linear, finely acuminate, flat, glabrous, nearly smooth, margins scaberulous, base rounded, sheaths shorter than the internodes, slender, keeled, mouth not auricled, glabrous, ligules very short; spikes solitary (in Ceylon), about 1 in. long, pale green, rhachis hardly fragile, internodes much shorter than the spikelets, ciliate; spikelets $\frac{1}{8}$ in. long, subsecund, imbricating, lower 3 or more pairs awnless, empty or male, upper sessile spikelets $\frac{1}{8}$ in. long, callus very short, shortly hairy below the middle; glume I thin, obovoid, obtuse, convex, dorsally glabrous, shining, margins ciliate above the middle, hardly winged, 9–11-veined from below the tip, broadly incurved below the middle, II subchartaceous, ovate-oblong, 3-veined, ciliate, keel smooth, III linear-oblong, obtuse, veinless, eciliate, IV the colourless base of the very slender awn, which is $\frac{1}{2}$–1 in. long with a scaberulous column, palea 0; lodicules cuneate, retuse; anth. linear; stigmas slender; pedicelled spikelets male, $\frac{1}{10}$ in. long, clavately obovoid; glume I many-veined, ciliate with long hairs, II and III as in the sessile spikelet, but smaller, and III ciliate, IV linear-oblong; grain broadly oval, compressed, pale brown.

Uva Province. Bibili, in Badulla district (Thwaites). North Central Province, Anuradhapura (Trimen).

India, Burma, the Andaman Islds., China, Mauritius.

The Peradeniya Herbarium specimens have all solitary spikes and naked nodes of the stem. In Indian specimens 2–4 spikes occur, the stem is sometimes pubescent above, the upper nodes are bearded, the lower often ciliate, and glume I of the sessile spikelets is hairy all over. The median vein described by Hackel as absent in the glume is often present. Thwaites observes that without careful examination this grass might easily be taken for a species of *Apocopis*.

12. **A. polyptychus,** *Steud. Syn. Gram.* 380 (1854).
Thw. Enum. 367. Hack. Monogr. Androp. 578. C. P. 32.
Fl. B. Ind. vii. 198.

Perennial; stems densely tufted, 2–3 ft. high, slender, simple, strict, glabrous, nodes villously bearded; l. 8–16 by $\frac{1}{10}$–$\frac{1}{4}$ in., strict, narrowed from the middle to the finely acute

tip, and below to the subpetiolate base, more or less clothed with soft spreading hairs, midrib slender, yellow, margins scaberulous, sheaths of upper long, terete, of lower compressed, mouth auricled, bearded with soft hairs, ligule short, rigid; spikes 3–6, subdigitately fascicled, erect, sessile or shortly peduncled, 2–3 in. long, unequal in length, rhachis fragile, internodes and pedicels about half as long as the spikelets, silkily villous, tips cupped; sessile spikelets bisexual or fem. except the lowest pair in each spike which are male or neuter, callus very short, shortly bearded; glume I oblong, obtuse, chartaceous, $\frac{1}{4}$–$\frac{1}{3}$ in. long, flat, smooth, 4–7-veined, margins narrowly incurved, ciliate above the middle, pale green or blueish, II membranous, obovate-oblong, acute, keeled, ciliate, 3-veined, III narrower, linear-lanceolate, acute, 1-veined, ciliate, IV the narrowly hyaline bifid base of the slender scaberulous awn, which is about $\frac{1}{2}$ in. long, palea 0, or minute, broadly ovate; lodicules quadrate, broader than long; anth. linear; styles and stigmas rather short, laterally exserted; pedicelled spikelets oblong, truncate, glume I convex, narrowly winged or not, II and III as in the sessile spikelets, IV linear-oblong, 2-toothed, 1-veined, ciliolate.

Elevated parts of the Central Provinces, up to an elevation of 7000 ft. Piderutalagala (Gardner), Nuwara Eliya, Horton Plains (Trimen).

Hackel does not mention the tips of the internodes of the spike as being cupped. He describes the sessile spikelets as only $\frac{1}{5}$ in. (5 mm.) long; I find them to be longer.

13. **A. contortus,** *Linn. Sp. Pl.* 1045 (1753). **I'-tana,** *S.*

Hack. Monogr. Androp. 585, excl. syn. *polystachyus*, Roxb. *Heteropogon hirtus*, Pers. Syn. ii. 533; Thw. Enum. 368.

Fl. B. Ind. vii. 199. All. Fl. Peden. t. 91. Reichb. Ic. Fl. Germ. t. 53 (*Heterop. Allionii*).

Perennial; stems 1–5 ft., tufted, erect or decumbent below, slender, leafy chiefly at the base, simple or subfastigiately branched, glabrous or scaberulous below the spikes, compressed towards the base; l. 6–10 by $\frac{1}{10}$–$\frac{1}{6}$ in., linear, obtuse, acute, or acuminate, flat, upper surface and margins scabrid or nearly smooth, glabrous or sparsely ciliate, with sometimes tubercle-based hairs, sheaths glabrous, lower compressed, keeled, mouth shortly auricled, ligule short, truncate, ciliolate; spikes $1\frac{1}{2}$–3 in., internodes very short, lower inarticulate; spikelets closely imbricating, subsecund, lower 2–6 or more sessile awnless, male or neuter; upper sessile spikelets narrow, long-awned, fem., $\frac{1}{4}$ in. long, callus long, acute, rufously bearded; glume I coriaceous, linear-oblong, truncate, dark brown, many-veined, hispidulous, margins strongly incurved, rounded, not winged, lateral veins apparently marginal, ciliate,

II linear, obtuse, concave, dorsally rigidly coriaceous, dark brown and hispidulous, margins sigmoidly inflexed, and tip chartaceous, white, III short, oblong, truncate, hyaline, veinless, IV the long subulate white base of a hirsute awn about 3 in. long, which is swollen where it leaves the spikelet; ov. linear, styles exserted at the top of the spikelet, stigmas longer than the spikelet, narrow; pedicelled spikelets much larger than the sessile, pedicel slender, glabrous, glume I lanceolate, acuminate, thin, green, flat or twisted, dorsally hispid with long tubercle-based hairs, margins more or less (often unequally) winged, wings serrulate, II oblong-lanceolate, acuminate, 5-veined, lateral veins in pairs, margins hyaline, white, III oblong, tip rounded, white, 1-veined, IV obovate-oblong, veinless, ciliate; lodicules minute, cuneate; anth. linear; lower sessile spikelets of the spike $\frac{1}{3}$ in. long, glume I oblong-lanceolate, sparsely hirsute, margins narrowly winged, II lanceolate, acuminate, 3-veined, margins hyaline, ciliate, III oblanceolate, hyaline, 1-veined, ciliate; grain (of sessile fem. spikelet) linear.

Common throughout the Island (Thwaites).

Moist hot countries, extending to the Mediterranean region.

This species varies a good deal in the glumes of the pedicelled and lower (on the spike) sessile neuter or male spikelets. Hackel refers Thwaites's specimen to his var. *Roxburghii*, characterised by the long ramous stems, often decumbent at the base, male spikelets with tubercle-based hairs all over the back or above the middle only, and more slender spikes, $1\frac{1}{2}$ in. long; all very inconstant characters in Ceylon. Commonly known in India as the Spear-grass, a pest to the cultivator and to the pedestrian, the callus of its hygrometric awns piercing ordinary clothing and the flesh beneath. 'Cattle do not touch it' (Ferguson).

14. **A. triticeus,** *Br. Prod.* 201 (1810).

Hack. Monogr. Androp. 588. *Heteropogon insignis*, Thw. Enum. 437. C. P. 3804.

Fl. B. Ind. vii. 200.

Perennial; roots of very stout tortuous fibres; stem 4–5 ft., robust, erect, leafy, simple or branched below, smooth, polished; l. 1–2 ft. by $\frac{1}{4}$–$\frac{1}{3}$ in., linear, acuminate, glaucous, sparsely hairy, margins scabrous, sheaths loose, compressed, coriaceous, mouth auricled, glabrous or bearded with long hairs, ligule short, rounded, ciliolate; spikes 3–6 in. long, green, rhachis inarticulate except the 4–6 upper internodes, glabrous; spikelets very many, all but the few terminal closely imbricating, subsecund, awnless, male or neuter, callus short, glabrous; upper sessile spikelets long-awned, $\frac{1}{3}$ in. long, callus long, acute, bearded with dark brown hairs; glume I linear-oblong, subterete, rigidly coriaceous, hispidulous, tip obtuse, glabrous, dorsally deeply grooved, sides involute, not

winged, II linear, terete, concave, rigidly coriaceous and scaberulous with pale glabrous chartaceous sigmoidly incurved margins, dorsally rounded, III short, oblong, hyaline, truncate, veinless, tip ciliate, IV the flattened white slender base of the awn, which is 2-3 in. long, very stout, hirsute, palea short, quadrate, 2-lobed, lobes fimbriate; lodicules large, linear-oblong, retuse, 2-toothed; ov. slender, tipped with a tooth between the styles, which and the very long stigmas are exserted at the top of the spikelet; upper pedicelled spikelets neuter, imbricating over the sessile, $\frac{1}{3}$–$\frac{1}{2}$ in. long, pedicel short, glabrous; glume I lanceolate, acuminate, flat, slightly twisted, winged on one or both sides, one or both margins inflexed, II and III lanceolate, acuminate, ciliate, II 3-veined, III smaller, 1-veined, IV narrowly oblanceolate, 1-veined, ciliate above the middle; lower spikelets (of the spike) sessile, neuter or male, $\frac{1}{2}$–$\frac{2}{3}$ in., narrowly oblong, obtuse, glabrous; glume I narrowly winged, margins narrowly incurved, II, III, and IV as in the upper pedicelled spikelets; anth. $\frac{1}{3}$ in. long.

Mahning-galla, Matelle, E. (*Thwaites.*)
Also in Central India, the Concan, Burma, Malaya, and Australia.

15. **A. hirtiflorus,** *Kunth, Revis. Gram.* ii. 569 (1829).
Hack. Monogr. Androp. 371. *A. zeylanicus*, Arn.; Thw. Enum. 368. *Schizachyrium zeylanicum*, Wight and Arn. *A. Pseudograya*, Steud. C. P. 3079.
Fl. B. Ind. vii. 357. Kunth, l. c. t. 198.

Perennial; stems densely tufted, erect, 1–4-ft., stiff, rather stout or slender, simple or branched upward, sometimes fastigiately, smooth, shining; l. 2–6 by $\frac{1}{8}$–$\frac{1}{6}$ in., linear, obtuse or subacute, coriaceous, midrib slender, veins obscure, sheaths tight, coriaceous, mouth not auricled, ligule rounded, stiff; spikes 2–5 in., slender, subterete, rhachis stout; internodes $\frac{1}{4}$–$\frac{1}{3}$ in., subclavate, concavo-convex, smooth, glabrous, brown speckled with red, mouth oblique, deeply tubular, toothed; sessile spikelets appressed to the internodes, $\frac{1}{3}$ in. long, narrow, callus stout, bearded with white hairs, sunk in the deep mouth of the internode; glume I linear-lanceolate, bicuspidate, coriaceous, dorsally convex, smooth, margins membranous, involute, keel above minutely scaberulous, II as long, recurved, laterally compressed, lanceolate, aristulate, ciliate, keel coriaceous, narrowly winged above the middle, sides broadly hyaline, ciliate, III oblong, hyaline, veinless, ciliate, IV short, broad, cleft nearly to the base into two subulate-lanceolate ciliate lobes, awn in the sinus rather longer than the spikelet, capillary, smooth, palea 0; lodicules cuneate; anth. small, linear; ov. slender, styles and narrow

stigmas not long; pedicelled spikelet imperfect, neuter, pedicel nearly as long as the internode, but more slender and ciliate with white hairs along one margin; glume I flat, subulate, acuminate or awned, II short, oblong; grain $\frac{1}{7}$ in. long, linear, terete.

Common from Colombo to an elevation of 4000 ft. in the Central and Uva Provinces.

Tropical and subtropical Asia, America, and Africa.

A widely diffused and variable grass, of which I have described the Ceylon form, which is all but wholly glabrous. A very hairy form is common in America.

16. **A. Schœnanthus,** *L. Sp. Pl.* 1046. Var. versicolor, *Hack. Monogr. Androp.* 610 (1889).

Herm. Mus. 66. Burm. Thes. 107. Fl. Zeyl. 465. Trim. Cat. Ceyl. Pl. 107. Moon, Cat. 72. *A. versicolor*, Nees; Thw. Enum. 367.

Fl. B. Ind. vii. 205.

Perennial; stem 2–3 ft., rather slender, erect or (often geniculately) ascending from a woody base, leafy upward, simple or branching, nodes glabrous; l. 6–10 by $\frac{1}{6}$–$\frac{1}{3}$ in., narrowly linear-lanceolate, tips capillary, flat, thinly coriaceous, quite smooth on both surfaces, glaucous beneath, margins faintly scaberulous, base narrow, rounded; sheaths smooth, glabrous, mouth shortly auricled, ligule ovate, scarious; panicle leafy, narrow, interrupted, of scattered or crowded bracteated fascicles of spikes; bracts $\frac{1}{2}$–$1\frac{1}{2}$ in., spathiform, lanceolate, finely acuminate, glabrous, margins hyaline, proper bracts as long as the spikes or longer, green or coloured; spikes unequal in length, longest $\frac{1}{2}$–$\frac{2}{3}$ in. long, of 4–6 internodes, shorter of 3–4, internodes much shorter than the spikelets, clavate, ciliate, mouth funnel-shaped, margin irregularly toothed; spikelets binate, a sessile and pedicelled; sessile spikelet in upper part of spike, bisexual, $\frac{1}{6}$ in., lanceolate, callus short bearded; glume I flat, thin, with a deep narrow median furrow from the base upward answering to a ridge on the ventral face, tip 2-toothed, margined above the middle with a narrow hyaline denticulate wing, II as long, chartaceous, laterally compressed, oblong acuminate, margins hyaline, ciliate, keel with a short dorsal toothed wing, III hyaline, linear-oblong, obtuse, ciliate, veinless, IV the narrowly winged 2-lobed base of the short smooth awn, lobes erect, lanceolate, palea minute, ovate; lodicules minute, cuneate; anth. linear; sessile spikelet in lower part of spike shorter, obtuse, strongly 7–9-veined, male; pedicelled spikelet male, narrowly oblong, glabrous, pedicel about as long as the internode and like it, glume I 9–11-veined, obtuse, margins narrowly incurved, minutely scabrid,

II as in the sessile spikelet, but thinner, dorsally rounded, III linear-oblong, tip rounded, hyaline, ciliate, faintly 2-veined; anth. and lodicules as in upper sessile spikelets.

More elevated parts of the Central Provinces (Thwaites). Abundant at Wilson's Bungalow, Uva, also at Colombo (Ferguson), Passawa, Ugaldura Valley, Hagkala.

The Deccan, China, Trop. and S. Africa.

*A. Schœnanthus* is a widely distributed and variable plant throughout the hotter parts of Asia and Africa, with difficulty distinguished from *A. Nardus*, except by the deep groove in the centre of glume I of the bisexual spikelets, which, however, is sometimes obscure or even absent. Its var. *versicolor*, however, differs (in Ceylon) from *A. Nardus* in the longer spikelets. The spikelets, however, vary so much in different parts of the spike as to require the above long description, which does not cover intermediate forms, which include some with very broad cordate and amplexicaul bases of the leaves.

Thwaites remarks that the infl. has, when crushed, a rather agreeable aromatic odour, and that the essential oil ('Lemon oil,' see Enum. p. 367) appears to be situated principally at the base of the spikelets.

According to Watt (Dict. Econom. Prod. of India, i. 249), *A. Schœnanthus* is the Geranium grass, Rusa oil grass, and Oil of Ginger grass of India, the oil of which bears a number of names. I find no record of its being cultivated in Ceylon, as is *A. Nardus.*

17. **A. Nardus,** *L. Sp. Pl.* 1046 (1753). **Maana,** *S.*
Herm. Mus. 26. Burm. Thes. 35. Fl. Zeyl. 45. Trim. Cat. Ceyl. Pl. 107. *A. Martini*, Thw. Enum. 367, non Roxb. C. P. 2733.
Fl. B. Ind. vii. 205. Benth. and Trim. Medic. Pl. t. 297.

Stem 2–5 ft. high, or more in cultivated forms, erect from a stout woody base, which sometimes forms a caudex nearly an inch in diameter, emitting dense masses of long stout fibrous roots, simple or branched, smooth, polished, solid, leafy upwards; l. a foot long and upwards, $\frac{1}{6}$–1 in. broad, linear, tapering from the middle to a filiform tip and downwards to a narrow base, rigidly coriaceous, more or less scabrid on both surfaces and margins, glaucous beneath, midrib broad and white above, slender and green beneath, sheaths shorter than the internodes, terete, coriaceous, smooth, mouth with rounded auricles, ligule ovate, scarious, ciliolate; panicle very variable, elongate, interrupted, leafy, very many-fld., contracted or effuse, general and proper bracts, $\frac{1}{2}$–1 in., narrowly lanceolate, acuminate, glabrous, coriaceous, margins not membranous; spikes binate on a short pedicel, unequal, longer $\frac{1}{4}$–$\frac{1}{2}$ in. long, often at length deflexed, pedicel not half the length of the bract; internodes much shorter than the spikelets and with the compressed pedicels of upper spikelets laterally copiously, villously ciliate, tip funnel-shaped, deeply hollowed, mouth irregularly toothed; spikelets few, binate, a sessile bisexual and a pedicelled male; sessile spikelet $\frac{1}{8}$–$\frac{1}{7}$ in.

long, oblong-ovate, obtuse or subacute, callus short, obtuse, bearded; glume I thin, flat, acute or minutely 2-toothed, glabrous, obscurely veined, margins inflexed, obscurely winged and scaberulous above the middle, II obovate-oblong, acuminate, 1–3-veined, keeled, margins ciliate, keel with a short ciliolate wing above the middle, III oblong, hyaline, ciliate, veinless, IV hyaline, linear, bifid, ciliate, awned or not between the acute lobes, awn rarely more than twice the length of the spikelet, slender, palea 0 or very minute, ciliate; lodicules cuneate, retuse with one angle produced into a tooth; anth. narrow; styles and stigmas short; pedicelled spikelet oval-oblong or obovoid, obtuse, glabrous, glume I convex, many-veined, II membranous, not keeled, 3-veined, III and anth. as in the sessile spikelet, IV 0 or rudimentary; grain fusiform.

Central Province, covering considerable areas at elevation of 2–4000 ft. (Thwaites).

Temp. and Subtrop. Asia, Africa, and Australia.

The best known and one of the most remarkable grasses in Ceylon. It covers thousands of acres of the patanas of the interior, up to 5000 ft. (Ferguson).

There are two principal forms of it in Ceylon, a wild and a cultivated. The wild is the Maana Grass of the patanas, C. P. 2733, of which the only specimens in the Peradeniya Herbarium are from low elevations, Galle (Thwaites), Maoya, Peradeniya (Trimen). It sometimes forms a stout, erect, scarred caudex several inches long and as thick as the thumb, the infl. is contracted, the spikelets larger than in the cultivated form, and the glume of the sessile spikelet is sometimes, but rarely, depressed in the central line as in *A. Schœnanthus*, or presents a shallow pit. It is the var. *nilagiricus* of Hackel. It is not used for the manufacture of Citronella oil.

The other form, only known in cultivation, is *A. Nardus genuinus* of Hackel, and the *A. Nardus* of the Linnæan Herbarium. It is a tall robust plant with broader leaves, an effuse panicle with zigzag branches, divaricate bracts, smaller spikelets, and no well-developed awn. The only specimen in the Peradeniya Herbarium is from Dr. Trimen, labelled 'Pangiri Maana, cult. for Citronella oil, near Deyandera, and Mawendelle, S. Prov.' The very long, broad, flat, coriaceous, shining sheath of the lower l., 6 in. long and $\frac{1}{2}$–$\frac{2}{3}$ in. long, appear to be peculiar to it.

Var. *luridus*, Fl. B. Ind. vii. 206, differs from var. *nilagiricus* chiefly if not wholly by the dark purplish-brown spikes. The only specimens are collected by Gardner and Maxwell. Mr. Lewis informs me that Citronella oil is very useful in combating the attacks of jungle leeches.

18. **A. Thwaitesii,** *Hook. f.*

*A. distans*, Thw. Enum. 367, non Nees. C. P. 3784.

Perennial; stems 2–3 ft., densely tufted, slender, as thick as a crow-quill below, smooth, polished, internodes much longer than the l.-sheaths; l. 10–14 in. by $\frac{1}{10}$–$\frac{1}{4}$ in. broad about the middle, narrowed to a capillary tip, and petioled base, flat, minutely scaberulous on both surfaces and on the margins,

midrib slender, sheaths smooth, not auricled, ligule $\frac{1}{5}$ in. long, broadly oblong, truncate, rigidly coriaceous; panicle of few shortly peduncled fascicles of spikes; bracts lower and proper very narrowly lanceolate; spikes $\frac{1}{2}$–1 in., erect, pale chestnut-brown, pedicel much shorter than the proper bract which is shorter than the spikes; internodes and pedicels of the upper spikelet about half as long as the sessile spikelet, slender, silkily villous, tips funnel-shaped, mouth toothed; sessile spikelet $\frac{1}{5}$–$\frac{1}{3}$ in.; glume I narrowly lanceolate, finely acuminate, tip bicuspidate, flat, smooth, glabrous, margins narrowly incurved, obscurely scaberulous above the middle, veins 3, 2 lateral in each flexure, II–IV ciliate, II chartaceous, ovate-oblong, finely acuminate, keeled, 1-veined, margins hyaline, keel scaberulous, III oblong, acute, hyaline, 3-veined, IV the narrowly oblong hyaline deeply lobed base of the awn, lobes lanceolate, ciliate, awn very slender, smooth, up to $\frac{1}{2}$ in. long, palea minute, broadly ovate, ciliate; lodicules very minute, quadrate; anth. linear-oblong; styles and stigmas very slender; pedicelled spikelet as long as the sessile, but narrow, glume I convex, many-veined, glabrous, II and III as in the sessile spikelet, but narrower, IV 0.

Nuwara Eliya (Thwaites, Aug. 1864).
Endemic.
This is the plant mentioned in Fl. B. Ind. (vii. 208) under *A. Nardus*, var. *luridus*, as a possible form of that plant or of var. *nilagiricus*. An examination of better specimens in Herb. Peradeniya has convinced me that it cannot be thus disposed of. Its chief characters are the slender habit, crowded radical l. which are very narrow, terminating above in capillary tips and below in a naked petiole, the long rigid ligule, the simpler infl., and very long spikelets. In many respects it resembles the N. Indian *A. Gidarba*, Ham., but the internodes are very slender, the sessile spikelets much longer and narrower, and glume I is quite flat. Thwaites's are the only specimens, and these are from one locality only.

19. **A. lividus,** *Thw. Enum.* 367 (1864).
Hack. Monogr. Androp. 615. C. P. 953.
Fl. B. Ind. vii. 209.

Perennial; stems 1–2 ft., tufted, slender, leafy chiefly at the base, rigid, smooth, nodes naked; l. 4–6 in., strict, erect, $\frac{1}{6}$–$\frac{1}{5}$ in. broad at the middle, tapering from thence to the setiform tip and very narrow almost petioled base, flat, glabrous, smooth above, scaberulous beneath and on the margins, sheaths glabrous, mouth not auricled, ligule large, ovate, scarious; infl. a simple raceme of 2–4 very long-peduncled spikes in the axils of narrowly lanceolate or linear glabrous bracts 1–3 in. long, peduncles 1–2 in. long, capillary, smooth, proper bracts filiform, as long as the spikes or shorter;

spikes $1\frac{1}{2}$ in. long, pedicel much shorter than the proper bract, internodes much shorter than the sessile spikelet and pedicel of the upper, both of which are silkily villous, their tips funnel-shaped; spikelets 10–15 pairs, sessile bisexual, $\frac{1}{4}$–$\frac{1}{3}$ in. long, lanceolate; glume I flat, thin, smooth, glabrous, broadly winged from below the middle to the minutely truncate tip, veins 0 or obscure, margins inflexed, membranous, wings serrulate, II as long as I, coriaceous, linear-oblong, concave, keeled, obtuse, keel narrowly winged above the middle, margins hyaline, ciliate, III oblong, hyaline, margins and rounded tip ciliate, IV deeply bifid, hyaline, ciliate, awned between the lanceolate acuminate ciliate lobes, awn capillary, geniculate, not twice as long as the spikelet, palea small, spathulate, ciliate; lodicules broadly obliquely quadrate; anth. linear-oblong; styles and stigmas short; pedicelled spikelet $\frac{1}{4}$ in., glume I ovate-lanceolate, truncate, many-veined, II ovate-oblong, acute, 5–7-veined, margins narrowly hyaline, ciliate, III as in the sessile spikelet, IV 0, or linear; lodicules cuneate; anth. linear.

Elevated parts of the Central Province, up to 7000 ft. Spikes livid purplish.
Also in the Nilgiri Hills.

20. **A. filipendulus,** *Hochst. in Flora,* xxix. 115 (1846).
*Anthistiria fasciculata,* Thw. Enum. 366. C. P. 940.
Fl. B. Ind. vii. 209.

Perennial; stems 2–4 ft., tufted, slender, leafy simple or branching from the base, nodes glabrous; l. 6–12 in., very slender, $\frac{1}{12}$–$\frac{1}{10}$ in. broad, linear, setaceously acuminate, flat, glabrous, nearly smooth or margins scaberulous, base rounded, sheaths smooth, mouth with rounded auricles, ligule large, membranous, ciliate. decurrent on the auricles; infl. a narrow erect panicle of filiform branches bearing long-peduncled spikes, bracts erect, 1–2 in. long, linear-lanceolate, setaceously acuminate, proper bracts filiform, longer or shorter than the capillary ped. of the two spikes of which one is generally sessile, the other shortly pedicelled; internodes and slender pedicel of upper spikelets ciliate, tips funnel-shaped; spikelets 1–3 pairs in each spike, narrowly lanceolate, sessile bisexual, $\frac{1}{4}$ in. long including the long acute silkily hairy callus; glume I oblong-lanceolote, tip truncate, dorsally flat, hairy below the middle, margins narrowly incurved, smooth, but ciliate with long hairs, veins obscure, II and III linear-oblong, obtuse, ciliate, II 1–3-veined, III hyaline, veins 0, IV the narrow sagittiform base of the

awn, which is 2 in. long, column twisted, hispid, palea 0; lodicules cuneate; anth. short; styles and stigmas short; pedicelled spikelet as long as the sessile, narrowly lanceolate, acuminate, subterete, glumes I and II speckled with rusty red dots, I convex, many-veined, sparsely hairy, II oblong, obtuse, apiculate or aristulate, 3-veined, ciliate, III obovate-oblong, obtuse, III and IV hyaline, obtuse, 1-veined, ciliate with deflexed hairs, III linear-oblong, IV subspathulate, tip entire or bifid; anth. slender; besides the above bisexual and male spikelets there are solitary sessile linear oblong speckled males.

Badulla district, up to 3000 ft. elevation (Thwaites). Awns golden-col'd.

Trop. Asia, Africa, and Australia.

Hackel, who makes four varieties of this species, describes the Ceylon plant as var. *Thwaitesii*, characterised by the proper spathes being from one-half to twice as long as the peduncle, and having two pairs of homogeneous spikelets and one of heterogeneous in the long-pedicelled spike. These characters I find inconstant. The leaves of the Ceylon plant are very much narrower than some Khasian.

There is in the Peradeniya Herbarium an indifferent specimen of what may be a very tall robust form of *A. filipendulus*, and so named by Trimen, collected by Ferguson at Uda Pusselawa.

A. CITRATUS, *DC.*—Ferguson in his Grasses Indigenous to Ceylon, p. 32, gives No. 116, *A. citratus*, DC., Lemon grass, as cultivated for Lemon-grass oil. This species was founded by De Candolle on a flowerless plant in the Montpellier Bot. Garden, of which Hackel says that from the description it may be either *A. Nardus* or *A. Schœnanthus*. Watt (Dict. of Econ. Prod. of India, i. 242) cites for it *A. Schœnanthus*, Wall. Cat. Pl. Rar. t. 280, which Hackel refers to *A. Nardus*, var. *grandis*. Watt describes it as a large coarse glaucous grass, largely cultivated all over India, Ceylon, and the Eastern Archipelago, rarely or never flowering, and yielding Lemon-grass oil, Verbena oil, or the Indian Melissa oil. He adds that it is called Penguin in Ceylon, where the annual produce of its otto is 1500 lbs.; and that its chief use is as a perfume and for flavouring tea. In a stray note of Dr. Trimen's which I find amongst his MSS., is the following:—'Sera, the Malay name for *A. Schœnanthus*, *A. citratus* (?) var. with narrow leaves. This is grown in native gardens, and the leaves are used only to flavour curries. The lemon scent is rather faint. Not known to flower.'

There is no specimen named *A. citratus* in the Peradeniya Herbarium, but Thwaites alludes, under *A. Martini*, to Lemon oil as derived from *A. Schœnanthus*, adding that it is considered not to be indigenous, and that it rarely flowers.

Ferguson says, l. c. of this grass, 'The centres of the leaf-buds are sold in every bazaar in Ceylon, and are universally used in curries to give them a flavour. I have no doubt that this plant was introduced by the Malays to Ceylon, and I believe it to be that figured and described by Rumph in his Herb. Amboinense, vi. t. 6, f. 2. About twenty years ago Mrs. Winter Jun[r], of Badegama, near Galle, sent me a specimen in flower, and informed me that it was the first flower that had been seen for twenty years. After several years' careful cultivation "of the Lemon

grass in the Circular walk" (of the Bot. Gard.?), several plants of it flowered in Jan. 1878, from which I secured good specimens.'

### 40. PSEUDANTHISTIRIA, *Hook. f.*

Annual grasses, with the habit and infl. of *Anthistiria*, but wanting the involucrate spikelets of that genus; spike usually consisting of a sessile bisexual spikelet, with a solitary pedicelled male, terminated by a second sessile bisexual with two male pedicelled spikelets.—Sp. 4; all in *Fl. B. Ind.*

**P. umbellata,** *Hook. f. Fl. B. Ind.* 220 (1896).
*Andropogon umbellatus*, Hack. Monogr. Androp. 401. *Anthistiria heteroclita*, Thw. Enum. 366, non Roxb. C. P. 963.
Fl. B. Ind. l. c.

Perennial; stems densely tufted, filiform, flaccid, leafy, 1–2 ft. high, ascending from an extensively creeping rootstock with filiform root-fibres; l. ½–2 in. long, oblong-lanceolate, acuminate, thin, scaberulous on both surfaces and margin, base rounded or cuneate, sometimes petiolulate, veins very slender, sheaths much shorter than the internodes, auricles small, margins membranous, ciliate, ligule a narrow ciliate membrane; fascicles of few spikelets, on axillary flexuous capillary peduncles ¼–½ in. long, rarely longer, bracts ½–1 in. long, narrowly lanceolate, finely acuminate, sparsely setose, proper bracts hardly longer than the spikes, about ¼ in. long; bisexual spikelet sessile, ⅙ in. long, callus very short; bearded; glume I ovate or linear-oblong, truncate, chartaceous, 7-veined, margins incurved below the middle, II lanceolate, acuminate, 3-veined, membranous, glabrous, III very small, quadrate, IV the very narrow hyaline base of the capillary awn, which is ½–⅔ in. long, geniculate above the middle; lodicules cuneate; anth. linear; styles and stigmas short; male spikelets ¼ in. long, on ciliate pedicels, lanceolate, acuminate; glume I thin, about 9-veined, margins narrowly incurved, scaberulous above the middle, II lanceolate, acuminate, 3-veined, glabrous, III very small, oblong.

Common in the more elevated parts of the Island. Patanas of Dambulla and Hantane districts, forming the entire covering of open ground.
Also in the Western Ghats.
An excellent fodder, green or dry (Ferguson).

### 41. ANTHISTIRIA, *L.*

Annual or perennial grasses; l. long, narrow; infl. elongate, leafy, formed of racemes or panicles of fascicles of very short spikes in the axils of spathiform bracts, rhachis of spike articulate above the four lower spikelets; spikelets 7–9, dimorphic, 4 whorled or subwhorled, male or neuter, forming

an involucre round either one sessile bisexual with two pedicelled spikelets, or two superposed bisexual, the lower with one pedicelled, the upper with two; involucrant spikelets longest, sessile, callus 0, glumes 3, I oblong-lanceolate, acuminate, flattened, base sometimes thickened, margins narrowly incurved, keels narrowly winged, II membranous, 3-veined, III hyaline, 1-veined; anth. large; bisexual spikelets much smaller, narrowly oblong, subterete, obtuse, callus rigidly bearded; glume I coriaceous, margins strongly incurved, II as long as I, linear, hyaline, 3-veined, dorsally chartaceous, sides broadly incurved, membranous, III very small, hyaline, epaleate, IV the attenuate or flattened base of a long geniculate awn; lodicules connate; anth. small; styles short, spreading from the base, stigmas long, slender, variously exserted; pedicelled spikelets like the involucrant, but narrower, male or neuter, pedicels glabrous, callus 0, keels of glume I not winged; grain (of sessile spikelets) narrow, biconvex, embryo long.—Sp. about 12; 11 in *Fl. B. Ind.*

Involucrant spikelets truly whorled . . . . 1. A. IMBERBIS.
Involucrant spikelets in closely superposed hairs.
  Infl. a decompound thyrsiform panicle . . . 2. A. CYMBARIA.
  Infl. a racemiform panicle . . . . . . 3. A. TREMULA.

1. **A. imberbis,** *Retz. Obs.* iii. 11 (1783).

*A. ciliata*, Retz. var. *majus*. Thw. Enum. 306. *Themeda Forskalii*, Hack. Monogr. Androp. 659. *A. arguens*, Trim. Cat. Ceyl. Pl. 108, non Willd. C. P. 962.

Fl. B. Ind. vii. 211. Lamk. Ill. t. 841, f. 2, and Cat. Ic. t. 459 (*A. ciliata*).

Perennial, densely tufted; stem 2–8 ft., stout or slender, subsimple or branched, glabrous, polished; l. 6–8 in., narrowly linear, finely acuminate, coriaceous, keeled, upper surface and margins scabrid, sheaths compressed, smooth, mouth not auricled, ligule a narrow ciliolate membrane; panicle racemiform, fascicles of spikelets distant, subflabelliform, 1 in. broad, ped. 1–2 in., filiform; bracts glabrous or sparingly pilose, hairs not tubercle-based, outer narrow, 1½–3 in. long, proper bracts ½–¾ in., or longer; spikes very shortly peduncled; involucrant spikelets truly whorled, sparingly hairy, bases thickened; bisexual spikelet solitary, $\frac{1}{5}$ in. long, callus elongate, pungent, beard coloured; glume I dorsally convex, smooth, dark brown, not dorsally channelled, awn 1½–2¼ in., column stout, hispid; grain $\frac{1}{10}$ in., oblong, grooved ventrally.

Common up to 4000 ft. elevation, abundant in the patanas of the Central Province.

Warm regions of the old world.

Often 6–8 ft. high on banks of streams and near water (Ferguson).

There are two forms of this species in Herb. Peraden. under the same number: one smaller, stem more slender, with few nodes, l. chiefly basal with equitant sheaths; the other with many internodes, the lower of which as stout as a small goose-quill.

There occur in this and other species copious membranous ovate-lanceolate acuminate scales amongst the bracts, which represent imperfect male spikelets.

2. **A. cymbaria,** *Roxb. Hort. Beng.* 6 (1814). **Kara wata maana,** *S.*

Thw. Enum. 436 and 366. *A. ciliata*, Retz. C. P. 3257, 3803.
Fl. B. Ind. vii. 215.

Perennial; stems 3–8 ft., stout, erect, branched, smooth, polished, clothed at the base with broad strongly compressed equitant l.-sheaths, together $1\frac{1}{4}$–2 in. across, internodes long, nodes glabrous or puberulous; l. 2–4 ft. by $\frac{1}{6}$–$\frac{1}{4}$ in., tip filiform, rigidly coriaceous, scaberulous above and on the margins, upper convolute, filiform, sheaths quite smooth, lower $\frac{1}{2}$ in. broad at the base, strongly compressed, keels smooth, upper subterete, mouth not auricled, sides bearded with long soft hairs, ligule a large stiff erose membrane; panicle 1–2 ft., supra-decompound, branches loaded with small shortly peduncled oblong fascicles, $\frac{1}{2}$–$\frac{3}{4}$ in. long, of nearly glabrous bracts and spikes; bracts all short and narrow, hardly exceeding the spikes; involucrant spikelets $\frac{1}{6}$–$\frac{1}{4}$ in., contiguous in superposed pairs, glabrous; bisexual spikelets 1 or 2, subsessile, callus short, bearded with white hairs; glume I $\frac{1}{4}$ in., narrow, dorsally convex, not channelled, smooth, polished, dark brown, awn about $\frac{1}{2}$ in., slender, smooth.

Patanas of Uva and the Central Provinces, &c., very abundant.

Also in the Western Ghats and Nilgiri hills.

*A. ciliata*, Thw. C. P. 3257, is in Fl. B. Ind. referred to as *A. imberbis*, var. *vulgaris*, but the solitary Peradeniya specimen is certainly a young state of *A. cymbaria.*

Ferguson (Grasses Indig. to Ceylon, 27) says of C. P. 3257, that it is especially abundant in the patanas of Dambulla, in many of which it is the principal grass, and is often cut and dried for fodder for cattle, and that it is perhaps in this respect the best substitute for hay of all the grasses found in Ceylon. Also that several years ago (dating from 1886) large quantities used to come from Bombay with batches of horses for sale.

3. **A. tremula,** *Nees ex Steud. Syn. Gram.* 401 (1854). **Pinibaru-tana,** *S.*

Thw. Enum. 366. *Themeda tremula*, Hack. Monogr. Androp. 667. *Anthoxanthum avenaceum*, Retz. (?); Moon, Cat. 4. C. P. 961.
Fl. B. Ind. vii. 211.

Annual or perennial; stems 2–6 ft., stout or slender, erect

or ascending from a creeping rootstock, simple or branching, smooth, polished, brown; l. 6–24 in. by $\frac{1}{6}$–$\frac{2}{3}$ in., finely acuminate, tips setaceous, scaberulous, sheaths slightly compressed, smooth, mouth not auricled, ligule a very narrow ciliolate membrane; panicle elongate, 1–2 ft., racemiform, fascicles of spikes and bracts rather distant on capillary flexuous peduncles $\frac{1}{2}$–3 in. long, subflabelliform or subglobose, $\frac{1}{2}$–1$\frac{1}{2}$ in. broad, sometimes reduced to a few bracts and spikelets, outer bracts much longer than the fascicles, 1–1$\frac{1}{2}$ in. long, more or less hairy, hairs simple or tubercle-based, proper bracts glabrous or softly hairy, margins membranous; involucrant spikelets in contiguous superposed pairs, about $\frac{1}{3}$ in. long, rhachis of spike produced beyond them; glume I linear-lanceolate, acuminate, covered with long often tubercule-based bristles, many-veined, male or empty, II oblong-lanceolate, acuminate, 1–veined, ciliate above the middle, margins inflexed, III as long, very narrowly linear, hyaline, 1–veined, glabrous; lodicules cuneate; anth. about $\frac{1}{10}$ in. long; bisexual spikelets 2, sessile, linear-oblong, obtuse, callus small with a short coloured beard, glume I scabrid, deeply channelled dorsally, tip hispid, awn $\frac{1}{2}$–1 in.; pedicelled spikelets like the involucrant but nearly glabrous, glumes 3, I veinless winged on one margin, II and III as in the involucrant spikelets.

An examination of the Peradeniya Herbarium specimens of this species, together with those in Herb. Kew. shows that there are three varieties of it in Ceylon.

Var. **tremula** proper.

Stems 1–3 ft., rarely stouter than a crow-quill; l. 6–12 in.; panicle 1–2 ft. subsimple, fascicles of spikelets subracemiform, $\frac{1}{2}$–1 in. broad, greenish when dry, on flexuous capillary ped., outer bracts $\frac{1}{2}$–1 in., proper bracts not twice as long as the spikes, awn $\frac{1}{2}$–$\frac{3}{4}$ in. long.

Var. **Thwaitesii,** *A. Thwaitesii*, Hook. f. Fl. B. Ind. vii. 215.

Stem tall, probably up to 6 ft., very stout, nodes glaucous; l. 1$\frac{1}{2}$–2 ft., fascicles of spikes greenish, 1–1$\frac{1}{2}$ in. broad, outer bracts 1–2$\frac{1}{2}$ in. much longer than the fascicles, awn 1 in. long.

Var. **brunnea,** *Hook. f.*

Stem slender 3–4 ft.; l. 6–10 in.; panicle 12–18 in. long, narrow subracemiform; fascicles of spikes crowded, subglobose, $\frac{1}{2}$–$\frac{2}{3}$ in. diam., hirsute with tubercle-based hairs, pale brown, ped. long flexuous outer bracts as long or rather longer than the fascicles, awn $\frac{3}{4}$–1 in. long.

Abundant throughout the Island. Var. *brunnea*, near Moragala (Trimen), Madulsema (Pearson).

India, from the Central Provinces southwards.

There is no specimen of var. *Thwaitesii* in Herb. Peradeniya, but there is one in Herb. Kew. from Thwaites, numbered C. P. 961, without a habitat. Var. *brunnea* is in Herb. Wallich, n. 8765, Herb. Heyne; and there is a specimen in Herb. Kew. from Herb. Rottler, also collected by Heyne and named *A. arguens*, from which it differs in the involucrant spikelets being in superposed pairs.

### 42. ISEILEMA, *Anderss.*

Habit and infl. of *Anthistiria*, but spikes articulate below the involucrant spikelets, and bisexual spikelets inarticulate at the base.—Sp. 5; 4 in *Fl. B. Ind.*

As observed by Hackel, the dispersal of the spikelets of *Iseilema* is by the wind carrying away all the spikelets in a body, whereas in *Anthistiria* the bisexual glumes alone disarticulate, and are more probably carried away by adhesion to the coats of animals.

**I. laxum,** *Hack. Monogr. Androp.* 682 (1889).

*I. prostratum*, Anderss. in Nov. Act. Soc. Sc. Upsal. Ser. 3, ii. 251, excl. syn. *Anthistiria prostrata*, Trim. Cat. Ceyl. Pl. 108 (non Willd.).

Fl. B. Ind. vii. 218. Anderss. l. c. t. 3.

Perennial; stem 3 in. to 1½ ft. high, ascending from a stout hard leafy sometimes shortly creeping rootstock, very slender, simple or sparingly branched, flexuous, root-fibres wiry; l. all cauline, or the lower radical and tufted with compressed equitant sheaths, 3–6 by $\frac{1}{20}$–$\frac{1}{8}$ in., linear, acute or obtuse, glabrous or ciliate, smooth or faintly scaberulous above; sheaths shorter than the internodes, rather membranous, smooth, mouth not auricled, ligule of long slender hairs; panicle racemiform, long, narrow, of distant axillary peduncled fascicles ¼–½ in. long, ped. capillary, ½–2 in. long, outer bracts narrowly lanceolate, ¼–1 in. long, glabrous or with a few hairs toward the margins, proper bracts about as long as the spikes; pedicel of spikes short, smooth; involucrant spikelets truly whorled, $\frac{1}{6}$ in. long, pedicelled, oblong-lanceolate, acute, pedicels short, flattened, bearded at the base; glumes I and II sparsely ciliate, I 3–5-veined, II oblong-lanceolate, acuminate, 3-veined, III linear, glabrous, hyaline; lodicules cuneate, retuse; anth. long, narrow; 2 upper male spikelets on long ciliate pedicels, lanceolate, glabrous; bisexual spikelet narrowly lanceolate, $\frac{1}{5}$ in. long, narrowed into a slender stipes, glabrous, glume I bifid or truncate at the tip, margins scaberulous in the upper third, thin, faintly 3–5-veined, II lanceolate, acuminate, 1-veined, tip scaberulous, IV a very slender geniculate awn about ½ in. long; stigmas long, exserted at the top of the spikelet; grain oblong, $\frac{1}{16}$ in. long, rounded at both ends, much compressed, pale, embryo more than half the length of the grain.

Northern, Eastern, and Western Provinces. Trincomalie, Batal Oya, Bet Chilan, Punakari, Jaffna District, &c.

Upper Gangetic Plain and southward, Mauritius (introd.).

Hackel gives good reasons for not adopting Andersson's name of *I. prostratum* for this species, which was erroneously supposed to be the *Andropogon prostratus* of Linnæus.

## 43. **ARISTIDA,** *Linn.*

Annual or perennial, tufted grasses; l. flat or convolute; spikelets panicled, 1-fld., not articulate on their pedicels, laterally compressed, rhachilla not produced beyond the flg. glume; glumes 3, I and II long very narrow, 1-veined, keeled, persistent, awn terminal or 0, III very narrow, cylindric, coriaceous, convolute, acuminate, 3-veined, terminated by 3 very long capillary awns, callus long, articulate at the base, palea minute, convolute round the ov. and grain, keels 0; lodicules 2, long, narrow, hyaline; stam. 3, anth. long, narrow; styles free, short stigmas penicillate, laterally exserted; grain long, narrow, cylindric, free in the convolute glume.—Sp. reputed about 100; 11 in *Fl. B. Ind.*

Empty glumes not awned . . . . . . 1. A. ADSCENSIONIS.
Empty glumes awned . . . . . . . 2. A. SETACEA.

1. **A. Adscensionis,*** *Linn. Sp. Pl.* 82 (1753) (*excl. syn. Sloane*). *A. depressa*, Retz.; Thw. Enum. 370. C. P. 3684.

Fl. B. Ind. vii. 225. Jacq. Eclog. Gram. vii. t. 6 (*A. divaricata*). Cav. Ic. t. 589 (*A. elatior*). Desf. Fl. Atlant. t. 21, f. 2 (*A. cærulescens*).

Annual or perennial; stem 1–2 ft., densely tufted, very slender, erect or ascending, simple or branched, branches erect, smooth; l. 3–12 in., convolute, filiform, quite smooth, sheath smooth, auricles rounded, ligule of very fine short hairs; panicle 3–12 in., contracted, subsecund, rhachis filiform, quite smooth, branches short and short pedicels capillary; spikelets erect; glume I $\frac{1}{6}$ in., oblong-lanceolate, acute, membranous, keel obscurely scaberulous, II $\frac{1}{4}$ in., very narrow, tip 2-toothed and apiculate, margins hyaline, keel smooth, fl. glume as long as II, 3-veined, smooth, awns not articulate on the glume, callus elongate, villous, palea minute, oblong, hyaline, retuse; lodicules very minute, lanceolate.

Trincomalie (Glenie), N. and W. coasts, Kalpitiya and Jaffna (Trimen). Moist warm countries.

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* Name from the Island of Ascension in the S. Atlantic Ocean, where it was collected by Osbeck in 1752.

2. **A. setacea,** *Retz. Obs.* iv. 22 (1786). **Et-tuttisi,** *S.*
*A. cærulescens*, Thw. Enum. 370 (non Desf.) A. Adscensionis, *Trim. Cat. Ceyl.* Pl. 108 (non Linn.). C. P. 915.
Fl. B. Ind. vii. 225.

Perennial; stem 1–3 feet, as thick as a crow-quill, erect or geniculately ascending from a woody base with stout wiry root-fibres, hard, smooth, polished, simple or branched; l. 6–12 in., usually convolute and filiform, rarely flat, up to $\frac{1}{8}$ in. broad, coriaceous, smooth, sheath long, smooth, auricles short, naked, ligule of short hairs; panicle very various, 6–12 in., long, inclined, sometimes subsecund, open or contracted, rhachis slender, smooth, branches rather distant, long or short, lower sometimes up to 4 in. long, filiform or capillary, naked towards the base; spikelets erect, pedicels capillary; glumes I and II keeled, very narrow, terminating in scabrid awns, I $\frac{1}{2}$ in. long, opaque, narrowed into the awn, keel scabrid, II rather longer, notched at the insertion of the awn, margins broadly hyaline, keel smooth; flg. glume about as long as the empty, 3-veined, mid-vein subscabrid, awns 1–1$\frac{1}{4}$ in. long, not articulate on the glume, scaberulous, callus long, silkily bearded with long hairs, palea $\frac{1}{20}$ in. long, chartaceous, veins or keels 0; lodicules narrowly obovate-oblong, obtuse, subfalcate, many-veined; stam. 3, anth. very slender; ov. narrow; grain $\frac{1}{5}$–$\frac{1}{4}$ in. long, very narrowly fusiform, narrowed to the acute base.

Common in the hot drier part of the Island.
Plains of Central and Southern India. Mascarene Isld.

### 44. GARNOTIA, *Brongn.*

Erect, perennial, rarely annual, stout or slender grasses; l. flat or convolute; spikelets panicled, very small, narrow, terete, 1-fld., solitary or binate, jointed on their pedicels, rhachilla not produced beyond the palea; glumes 3, I and II subequal, lanceolate, acute, acuminate or awned, strongly 3-veined, empty, III as long as II, lanceolate, acuminate or awned, thinly coriaceous or membranous, quite smooth, faintly 1-veined, paleate, bisexual, tip acute or minutely 2-toothed, awn rarely jointed, sometimes geniculate at the base or above it, very slender, scaberulous, palea as long as the glume, linear, flaps minutely auricled at the base; lodicules 2; stam. 3, anth. linear; styles free, stigmas with simple hairs, laterally exserted; grain linear or oblong, dorsally compressed, free within the glume and palea.—Sp. about 20; 12 in *Fl. B. Ind.*

Stem very stout, tall, basal l.-sheaths equitant.
 Spikelets long-awned . . . . . . 1. G. THWAITESII.
 Spikelets awnless . . . . . . . 2. G. TECTORUM.
Stem slender.
 Spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. long.
  Ligule a short membrane . . . . 3. G. FUSCATA.
  Ligule of long hairs . . . . . . 4. G. FERGUSONI.
 Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long.
  Annual.
   Spikelets long-pedicelled . . . . 5. G. MICRANTHA.
   Spikelets shortly pedicelled . . . 6. G. COURTALLENSIS.
  Perennial . . . . . . . . 7. G. PANICOIDES.

1. **G. Thwaitesii,** *Stapf in Fl. B. Ind.* vii. 241 (1896).
*G. scoparia*, Thw. Enum. 363. C. P. 942.
Fl. B. Ind. l. c.

Stem erect, 2–4 ft., rigid, as thick as a goose-quill below, smooth, polished, solid, internodes 3–5 in., nodes glabrous; l. 1–3 ft. by $\frac{1}{10}$–$\frac{1}{4}$ in., narrowly linear, acuminate, rigidly coriaceous, smooth above, beneath and margins scabrid, lower very narrow, wiry, striate, base not contracted, sheaths of lower 3–6 in., flattened, equitant, margins woolly, of upper cylindric, coriaceous, appressed or inflated, smooth, polished, margins eciliate, ligule a ridge of minute hairs; panicle 12–18 in., erect, contracted, rhachis smooth, branches innumerable, fascicled, filiform, erect, subsimple; spikelets $\frac{1}{8}$ in. long, rather distant, erect, shortly pedicelled, minutely bearded at the base; glumes I and II narrowed into short awns, brown and polished when ripe, veins very sparingly scabrid, III stipitate, acuminate, awn about $\frac{1}{5}$ in., inserted in a minute notch, geniculate; lodicules cuneiform, retuse.

Hotter parts of the Island, not uncommon. Rocks in the Western Province (Ferguson).

Endemic.

Grows only in the crevices of rocky hills, or in the merest bits of earth on the faces of rocks (Ferguson).

2. **G. tectorum,** *Hook. f. Fl. B. Ind.* vii. 242 (1896). TAB. XCIX. (*stricta*).
*G. stricta*, Thw. Enum. 363 (excl. syn.). (?) Berghansia mutica, *Munro in Proc. Amer. Acad.* iv. (1864), 362. C. P. 2968.
Fl. B. Ind. l. c.

Stem very tall, stout, as thick as a small goose-quill below, smooth, polished, solid, internodes glabrous; l. 2–2$\frac{1}{2}$ ft. by $\frac{1}{6}$–$\frac{3}{4}$ in., linear, obtuse, rigidly coriaceous, striate, smooth on both surfaces, margins smooth or scaberulous, base not contracted, lower very narrow, woolly towards the base, upper broad, glabrous, sheath of lower 6–8 in., subcompressed, equitant, narrow, woolly in the upper half, of upper loose, smooth, ligule a ridge of woolly hairs; panicle 12–18 in.,

narrow, rhachis strict, smooth, branches innumerable, fascicled, erect, at length spreading, lower hardly longer than the upper, filiform, smooth, branchlets divaricate, distant, spreading, capillary, bearing distant long or short-pedicelled spreading narrow spikelets $\frac{1}{5}$ in. long, with bearded bases; pedicels often much longer than the spikelets, capillary; glumes narrowly lanceolate, I and II subequal, subaristately acuminate, veins sparsely scaberulous, III acuminate, tip entire, at length dark brown, shining; lodicules hammer-shaped, erose.

Elevated parts of the Island, in swampy ground. Dumballa, Nuwara Eliya.

Also in China (?).

This and *G. Thwaitesii* cannot be well described from Herbarium specimens. Much used for thatching.

3. **G. fuscata,** *Thw. Enum.* 363 (1864).
C. P. 2756.
Fl. B. Ind. vii. 244.

Perennial, tufted, 10–20 in. high, soboliferous, leafing stems 1–3 in., erect, clothed with compressed sheaths, bearing a long very slender, smooth, 1–2-leaved ped. terminating in a depauperate raceme or panicle, internodes of leafing portion very short, of flowering 10–12 in. long; basal l. 1–2$\frac{1}{2}$ by $\frac{1}{6}$–$\frac{1}{3}$ in., linear, or narrowly oblong-lanceolate, acuminate, subdistichous, spreading, smooth, softly coriaceous, margin smooth, base very narrow, upper l. 2–3, small, narrow, very distant, sheath of basal leaves $\frac{1}{2}$–1 by $\frac{1}{6}$ in. broad, smooth, of upper l. very long, slender, terete, ligule a very short scarious membrane; raceme or panicle 1–2 in., very narrow, few-fld., rhachis slender, striate, smooth, branches few, very short or 0; spikelets $\frac{1}{5}$ in., lanceolate, subsolitary, subsessile or on capillary smooth pedicels shorter or longer than the spikelets, base bearded; glumes I and II lanceolate, aristately acuminate, veins scaberulous, III stipitate, membranous, tip 2-dentate, narrowed into a capilary awn about $\frac{4}{10}$ in. long, which is geniculately deflexed from near the twisted base; lodicules narrowly cuneate, incurved; grain narrowly obovoid.

Suffragam district, alt. 4000 ft. (*Thwaites*); Sabaragamuwa Province, alt. 4000 ft. (Ferguson). Spikelets purplish brown.

Endemic.

A remarkable species, differing in habit and in the depauperate infl. from its Ceylon congeners. Thwaites's specimens are very poor, and probably do not represent well-developed plants. I have not seen Ferguson's specimens.

4. **G. Fergusonii,** *Trim. in Journ. Bot.* xxvii. 170 (1889).
*G. patula*, Thw. MSS. (non Munro). *Andropogon Beckettii*, Thw. in Herb. Peraden. C. P. 3967.
Fl. B. Ind. vii. 242 (sphalm. *Fergussonii*).

Perennial; stem 2–3 ft., erect or ascending, slender, terete, rigid, smooth, naked below, much branched and leafy above, internodes 1–3 in. or more, nodes glabrous; l. 6–8 by $\frac{1}{4}$–$\frac{1}{3}$ in., narrowly linear-lanceolate, finely acuminate, spreading, flat, smooth, glabrous, thin, base narrow, rounded, sheaths smooth, mouth and ligule villous with long hairs; panicle 4–8 in., oblong, erect, rhachis smooth, branches suberect, fascicled, $\frac{1}{2}$–$1\frac{1}{2}$ in. long, many-fld., filiform; spikelets $\frac{1}{6}$–$\frac{1}{8}$ in., distant or crowded, erect, shortly pedicelled, base shortly bearded, glumes I and II narrowly lanceolate, aristately acuminate, or awned, awns short or sometimes as long as the glume, veins quite smooth, I 3-veined, III narrowly lanceolate, acuminate, tip 2-toothed, awn $\frac{1}{4}$ in. or shorter, obscurely geniculate at about the lower third; lodicules cuneate, retuse.

Var. **fastigiata,** *Hook. f.*

Stem naked and unbranched below for a foot or more, with internodes 3–4 in. long, then suddenly fastigiately branched and leafy with copiously divided branches, short internodes, and flat or involute narrow l. 1–3 in. long, panicle 2–3 in., narrow, with few short erect branches and few purplish spikelets.

Central Province, alt. 4–6000 ft. Matelle district, Amherst, Udapasselana (Ferguson, Beckett). Var. *fastigiata*, summit of Knuckles (Ferguson).

Endemic.

The var. *fastigiata* is a remarkable form, with a long naked stem, evidently drawn up amongst other plants. This alone is named *Fergusonii* by Trimen in Herb. Peraden.

5. **G. micrantha,** *Thw. Enum.* 363 (1864).
C. P. 944, 945.
Fl. B. Ind. vii. 244.

Annual; stems tufted, erect or ascending from a shortly creeping base, slender or rather stout, up to the thickness of a crow-quill, branched from below and upwards, smooth, internodes 2–4 in., nodes pubescent; l. 3–8 by $\frac{1}{6}$–$\frac{1}{2}$ in., spreading, linear-lanceolate, acuminate, glabrous, smooth, thin, very much narrowed from below the middle to the base, sheath shorter than the internode, often loose, smooth, auricles membranous, ligule a ridge of short hairs; panicle 6–12 in., rhachis slender, strict, smooth, branches very many, filiform, fascicled and whorled, at first erect and appressed, branchlets very long, capillary, distant, divaricate; spikelets $\frac{1}{10}$ in., linear-oblong, base naked, pedicels variable, often up to 1 in. long, smooth; glumes I and II membranous, acute, veins not strong, obscurely scaberulous, III substipitate, linear-oblong,

apiculate, very thin, tip bidenticulate, awn, if present, $\frac{1}{5}$ in. long, capillary, straight, erect; lodicules cuneate, retuse; grain linear-oblong.

Central Province, alt. 2–4000 ft. Spikelets very pale green.
Endemic.
Two forms have been distinguished, one with stouter stems creeping at the base and awned glume III; the other, var. *nana*, Stapf in Fl. B. Ind., with shorter, more slender stems and awnless glume III. But a fine series of specimens in Herb. Peraden. shows that these distinctions do not hold good.

6. **G. courtallensis,** *Thw. Enum.* 363 (1864).
*Miquelia courtallensis*, Arn. and Nees in Nov. Act. Nat. Cur. xix. Suppl. i. 1877 (1843). C. P. 454.
Fl. B. Ind. vii. 244.

Annual; stems 6 in.–2 ft., branching from the base and upwards, as thick as a sparrow's quill or more slender, erect, leafy, smooth, shining, internodes long or short, nodes pubescent; l. 1–3 by $\frac{1}{6}$–$\frac{1}{4}$ in. long, spreading, linear-lanceolate, acuminate, thin, smooth, glabrous, on both surfaces or sparsely covered chiefly beneath with long flexuous hairs, margins scaberulous, base rounded, contracted, sheaths glabrous or hairy like the l., ligule a short fringed membrane; panicle 2–4 in., long-peduncled, oblong, rhachis filiform, smooth, branches, $\frac{1}{2}$–1$\frac{1}{2}$ in., distant or in distant fascicles, widely spreading or deflexed, few-fld., rhachis slender, shining, and capillary branches smooth; spikelets $\frac{1}{10}$–$\frac{1}{8}$ in., few, distant or in distant pairs, upper of each pair longer than its pedicel, lanceolate, base minutely bearded; glumes I and II subequal, oblong-lanceolate, acuminate, glabrous or laxly clothed with long hairs, veins scabrid, III hardly stipitate, lanceolate, awned, tip minutely bidentate, awn as long as the glume or shorter, erect or if deflexed geniculate at about the lower third, which is purplish; lodicules cuneate.

Central Province, alt. 4000–8000 ft. Adam's Peak, Ramboda, Dambulla. Spikelets green or purplish.
Nilgiri and Travancore Hills.
The spikelets with long hairs on glume I and II occur on a branch of a specimen in which the spikelets on all the other branches are perfectly glabrous except on the scabrid veins. The column of the awn is either straight or very slightly twisted in Ceylon specimens.

7. **G. panicoides,** *Trim. in Journ. Bot.* xxvii. 181 (1889).

Perennial; stem 1–2 ft., rather stout, creeping and rooting at the base, then ascending, smooth, branched above, sparingly leafy, internodes 1–2 in., nodes glabrous; l. 6–8 by $\frac{1}{2}$–$\frac{2}{3}$ in., linear-lanceolate, acuminate, flat, rather thin, scaberulous above and on the margins, smooth beneath, base narrow,

rounded, sheaths glabrous, except at the sides and sometimes at the back of the mouth, ligule a very short, scarious, toothed membrane; panicle 6–12 in., effuse, rhachis smooth, branches numerous, in remote fascicles, 3–4 in. long, capillary, subsimple, erecto-patent; spikelets $\frac{1}{12}$ in., mostly solitary, distant, sessile, or upper of each pair usually shortly pedicelled, narrowly oblong, base naked; glumes I and II equal, oblong-ovate, acute, membranous, veins quite smooth, III shortly stipitate, linear-oblong, apiculate, membranous, awnless, palea acute; lodicules cuneate.

Kalutara, Culloden Estate (Ferguson). Spikelets green.

There is only a single specimen of this very distinct species in the Peradeniya Herbarium. It differs from *G. micrantha* in the ligule and shortly pedicelled spikelets.

### 45. **SPHÆROCARYUM,** *Nees.*

A dwarf annual; stem creeping and ascending, leafy throughout, rooting at the lower nodes; l. small, broadly ovate-cordate, acuminate, amplexicaul, coriaceous, sheaths shorter than the internodes, hispid; spikelets very minute, 1-fld., ellipsoid, pedicelled on the close-set capillary branches of an ovoid, terminal, subsessile panicle, articulate on the pedicels, rhachilla 0; glumes 3, membranous, cymbiform, I and II empty, obscurely 1-veined, II 1-veined, III flg., 1-veined; palea as long as its glume, 2-veined; lodicules 2, microscopic; stam. 3, anth. linear; ov. narrow, styles short, free, stigmas short; grain loose in the glumes, linear-oblong. —Monotypic.

**S. elegans,** *Nees ex Steud. Nom.* ed. 2, ii. 620 (1841).

*Grayia elegans*, Nees in Wight, Cat. n. 2033. *G. zeylanica*, Arn. ex Steud. Nom. ed. 2, i. 705. *Isachne pulchella*, Roth.; Thw. Enum. 362. *Panicum elegans*, Wight and Arn. ex Steud. l. c. ii. 256. *Andropogon Grayia*, Steud. l. c. i. 91. C. P. 879.

Fl. B. Ind. vii. 246.

Stem 6–12 in., as thick as a sparrow's quill, rarely branched, glabrous except at the setose nodes; l. all nearly alike in size and form, spreading or reflexed, $\frac{1}{3}$–1 in. long, above veinless, closely striate, beneath with 2–3 pairs of very slender veins, margins ciliated below the middle with long rigid tubercle-based bristles; sheaths very short, hispidly bristly, ligule a brush of white hairs; panicle 1–2 in. long, quite smooth, branches alt. and fascicled, lower $\frac{1}{2}$–$\frac{2}{3}$ in. long, erecto-patent; spikelets alt. on the branches, $\frac{1}{40}$–$\frac{1}{30}$ in. long, much shorter than their pedicels; glumes (in Ceylon

specimens) and palea all pilose with spreading hairs, I and II separately deciduous.

Damp places in the moist tropical region. Colombo, Hantane, Reigam Korale.

Also in Bengal, Burma, Singapore, and China.

A very singular little grass, of doubtful affinity, with the habit of a diminutive state of *Panicum ovalifolium*, and the foliage and deciduous empty glumes of *Isachne*. The spikelets are amongst the most minute of grasses; they are hairy in Ceylon specimens, but glabrous in some Indian.

### 46. **POLYPOGON,** *Desf.*

Annual or perennial, soft grasses, stem erect; l. flat; spikelets minute, 1-fld., articulate on their pedicels, laterally compressed, densely crowded on the short branches of a spiciform silky panicle; rhachilla not produced beyond glume III, naked; glumes 3, I and II empty, equal, linear-oblong, keeled, pubescent and ciliate, terminated by long capillary awns; III much smaller, articulate at the base, hyaline, truncate, awned, palea as long as the glume, hyaline, truncate, 2-veined; stam. 1–3, anth. short, styles distant at their bases, short, stigmas narrowly plumose; grain clavately obovoid, free within its glume.—Sp. few; 2 in *Fl. B. Ind.*

**P. monspeliensis,** *Desf. Fl. Atlant.* i. 66 (1798).

Thw. Enum. 370, 444. *P. zeylanicus*, Nees ex Steud. Syn. Gram. 183. *Agrostis panicea*, Willd.; Moon, Cat. 8. C. P. 144.

Fl. B. Ind. vii. 245. Beauv. Agrost. t. 6. f. 7. Reichb. Ic. Fl. Germ. i. t. 31.

Annual; stems densely tufted, erect, 1–2 ft. high, rather stout, smooth; l. 6–20 by $\frac{1}{6}$–$\frac{1}{4}$ in., acuminate, flaccid, scaberulous on both surfaces, narrowed to the base, midrib very slender, sheaths rather inflated, smooth, upper very long, ligule variable in length, oblong, scarious; spiciform panicle erect, 3–6 in. long by $\frac{1}{2}$–1 in. diam., narrowly ovate-oblong or cylindric, often lobulate, softly crinite, and glistening from the erect awns; spikelets (excl. awns) $\frac{1}{15}$–$\frac{1}{10}$ in. long, sessile or very shortly pedicelled on the branchlets of the panicle; glumes I and II oblong, nearly white, tips rounded, terminated by capillary erect awns about $\frac{1}{4}$ in. long, III not half as long as I and II, broadly oblong, truncate and toothed at the tip, 5-veined, awn rather longer than the empty glumes.

Uva district. Caltura (Thwaites), Adam's Peak, Haputale, and Hakgala (Trimen). Probably introduced. Infl. pale green or silvery.

All temp. and warm regions.

## 47. SPOROBOLUS, *Br.*

Perennial, rarely annual, glabrous grasses, erect or prostrate and creeping; l. narrow, flat or convolute; spikelets 1-fld., small or minute, in effuse or contracted panicles, articulate on their pedicels, rhachilla not produced beyond the palea; glumes 3, usually membranous, 1-veined or veinless, I and II empty, unequal, separately caducous, III not articulate at the base, ovate or oblong, obtuse or acute, callus very short, glabrous, palea as long as the glume and of the same texture, broadly oblong, often dorsally narrowly inflexed along the median line, presenting a vein-like ridge ventrally, along which the palea splits into halves, veins 0 or very obscure, close together, one on each side of the ventral ridge; lodicules very minute or 0; stam. 1–3, anth. short or long; styles 2, very short, free, stigmas short, hairs simple; grain oblong, obovoid or pyriform, free within the glume and palea, pericarp hyaline, loose; embryo large.—Sp. about 80; 14 in *Fl. B. Ind.*

| | |
|---|---|
| Glumes I and II shorter than III. | |
| Panicle very narrow, branches short. | |
| Spikelets $\frac{1}{20}$–$\frac{1}{18}$ in. long . . . . | 1. S. DIANDER. |
| Spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long . . . . | 2. S. INDICUS. |
| Panicle broad, branches very long . . | 3. S. WALLICHII. |
| Glume I as long as III or nearly so . . | 4. S. VIRGINICUS. |
| Glume I shorter than II and III, II nearly or quite as long as III. | |
| Panicle contracted. | |
| Glume I lanceolate, acuminate, 1-veined | 5. S. TREMULUS. |
| Glume I veinless, obtuse . . . | 6. S. ORIENTALIS. |
| Panicle effuse . . . . . . . | 7. S. COROMANDELIANUS. |

**1. S. diander,** *Beauv. Agrost.* 25 (1812).
Thw. Enum. 370. Moon, Cat. 8. C. P. 3771.
Fl. B. Ind. vii. 247. Jacq. Eclog. Gram. t. 28.

Annual or perennial; stems tufted, 1–3 ft. high, slender, quite smooth, internodes long; l. 6–12 in., very narrow, tips filiform, flat or convolute, quite smooth, veins strong, sheaths smooth, strongly ribbed, lower short, upper very long, auricles small, not bearded, ligule a ridge of minute hairs; panicle up to 10 in. long by 2 broad, erect, narrowly pyramidal, rhachis slender, quite smooth, branches alt., erecto-patent or spreading, capillary, lowest up to 3 in. long, naked at the base, bearing above very short racemules of very minute spikelets $\frac{1}{20}$–$\frac{1}{18}$ in. long, on very short pedicels; glumes 3, I and II hyaline, tips erose, I very short, broadly oblong, veinless, II about half as

long as III, oval, 1-veined, III broadly ovate-oblong, subacute, 1-veined, palea plicate in the median line; stam. 2, anth. half as long as the palea; grain pyriformly obovoid, truncate, obtusely 4-gonous, umbonate by the loose pericarp, red-brown, rugulose.

Var. **nanus,** *Hook. f.*

Whole plant, 3–6 in. high, densely tufted, leafy at the base chiefly, stems very slender; l. subulate, sheaths very short; panicle 1–2 in., interruptedly spiciform, spikelets $\frac{1}{20}$ in. long, in minute clusters, erect.

Very common throughout the Island. Var. *nana*, Jaffna (Trimen).
Trop. Asia and Australia.

Three stamens are said to occur in Indian specimens, and probably do in Ceylon, but I have found two only. Var. *nanus* was referred to *S. indicus* by Dr. Trimen, but, though differing so much in size and in the reduced panicle, I think the spikelets (hardly $\frac{1}{20}$ in. long) are undoubtedly those of *S. diander*.

2. **S. indicus,** *Br. Prod.* 170 (1810).
Thw. Enum. 370.
Fl. Brit. Ind. iii. 247. Trin. Sp. Gram. Ic. t. 60 (*Vilfa*). Jacq. Ic. Rar. iii. t. 16 (*Agrostis tenacissima*).

Perennial; stems 2–3 ft. high, densely tufted, stout, sometimes as thick as a small goose-quill, internodes long, base sometimes clothed with shining sheaths of old leaves; l. very slender, 1–2 ft., wiry, flexuous, convolute, rarely flat, tips long, filiform, quite smooth, sheaths smooth, strongly ribbed, lower short, upper long, mouth hardly auricled, ligule a ridge of very minute hairs; panicles 12–18 in. long by $\frac{1}{2}$–$\frac{3}{4}$ in. broad, often interrupted, rhachis slender, smooth, branches very short, densely crowded, erect, covered to the base with imbricating green spikelets $\frac{1}{12}$–$\frac{1}{10}$ in. long; glumes I and II hyaline, broadly oblong, veinless, I about one-fourth as long as III, half as long as II, III broadly ovate, acute, 1-veined, palea plicate in the median line; stam. 3, anth. half as long as the palea; grain pyriformly obovoid, 4-gonous, truncate, umbonate by the loose remains of the pericarp, red-brown, rugulose.

Very common throughout the Island.
All warm countries.

A much more robust plant than *S. diander*, with a very different infl. and larger spikelets; their grains are undistinguishable.

3. **S. Wallichii,** *Munro ex Stapf in Fl. Brit. Ind.* vii. 248 (1896).
Trimen in Journ. Bot. xxxvii. 171.
Fl. B. Ind. l. c.

Perennial (?); stem 3–4 ft., as thick as a goose-quill, or more slender, erect, strict, sparingly leafy, internodes very long; l. 1–2 ft. by $\frac{1}{4}$–$\frac{1}{6}$ in., flat or convolute and almost filiform,

narrowed into capillary tips, coriaceous, quite smooth, base narrow, sheaths smooth, mouth truncate, angles hardly bearded, ligule a ridge of minute hairs; panicle 12–18 in. by 4–5 in. broad, most laxly effuse, erect or nodding, rhachis filiform, smooth, branches capillary, erecto-patent, opp. alt. or fascicled, sparingly divided; spikelets minute, $\frac{1}{15}$–$\frac{1}{10}$ in., distant, solitary on very long capillary sparsely scaberulous pedicels, narrowly ovate; glumes hyaline, veins obscure or 0, I about half as long as II, both ovate-oblong, obtuse, III nearly twice as long as II, ovate-oblong, subacute, palea as long but broader, acute or 2-dentate, not inflexed along the median line, veins 0; stam. 3, anth. linear-oblong, one fourth shorter than the palea, yellow; grain pyriform, subtruncate, capped by the remains of the loose pericarp, pale brown, rugulose.

Between Trincomalie and Kantalar (Ferguson).

Also in Behar and Pegu.

In some Indian specimens the grain is obcordate, being retuse at the broad upper end.

4. **S. virginicus,** *Kunth, Revis. Gram.* i. 67 (1835). **Mudu Ætora,** *S.*

Trim. Cat. Ceyl. Pl. 108.

Fl. B. Ind. vii. 249. Trin. Sp. Gram. Ic. t. 48 (*Vilfa*). Labill. Pl. Nov. Holl. t. 23 (*Agrostis*).

Perennial; stems 6–12 in. long, erect from an elongate woody sheathed rootstock as thick as a crow-quill, that is usually buried in the sand, stout or slender, solitary or fascicled, naked below, copiously leafy above, lower internodes very short, stout, leafy, terminal long, slender, sheathed to near the panicle, sheaths of rootstock and bases of stems scarious; l. distichous, close-set, erecto-patent, 2–5 in. long, coriaceous, convolute, hence terete, rarely flat, narrowed from the base to the very slender, often recurved tip, dorsally rounded, quite smooth, deeply striate on the upper surface, sheaths $\frac{1}{6}$ to $\frac{1}{2}$ in., equitant, auricles very short, bearded, ligule of short fine hairs; panicle 2–3 in., erect, contracted, almost spiciform, pale green, branches very short, fascicled, appressed to the rhachis; spikelets very shortly pedicelled, $\frac{1}{10}$ in. long; glumes subequal, all 1-veined, rather thick in texture, I and II rather shorter than III, oblong-lanceolate, obtuse, I rather the shortest, III ovate, acute, palea plicate along the median line; anth. half as long as the palea; grain obovoid.

Sandy shores, not uncommon, but rarely flowering (Trimen). Colombo, Trincomalie, &c.

Mediterranean region, Africa, America, Australia.

It is singular that there is no record of this grass having been found in India proper. Grain not seen in Ceylon specimens, the flowers of which seem to be imperfect.

5. **S. tremulus,** *Kunth, Revis. Gram.* i. 67 (1835).
*S. orientalis*, Trim. Cat. Ceyl. Pl. 108 (non Kunth).
Fl. B. Ind. vii. 250.

Perennial, glaucous, stoloniferous; stems 2–6 in. long, very rigid, forming matted patches on a woody knotted rootstock, or loosely tufted, or more slender and widely spreading from fibrous roots, stolons up to 18 in. long, filiform, distantly leafy, sending up short branches; l. $\frac{1}{2}$–$1\frac{1}{2}$ in., distichous, subulate, or acicular, crowded on the shorter branches, spreading and recurved, convolute, rarely flat, narrowed from the base to the acute tip, sheaths very short, equitant on the shorter branches, smooth, glabrous, auricles obtuse, ciliate, ligule of short fine hairs; panicle 1–2 in., very narrow, subspiciform, ped. very slender, smooth, branches very short, erect, densely panicled; spikelets $\frac{1}{10}$ in. long, shortly pedicelled, pale green or white; glumes I and II ovate-lanceolate, acuminate, 1-veined, I about one third shorter than III, II as long as III, which is ovate, subacute, palea plicate along the median line; stam. 3, anth. $\frac{1}{3}$ shorter than the palea; grain broadly oblong, laterally compressed, rounded at both ends, tipped by the globose remains of the pericarp, quite smooth, yellow-brown.

Near the sea; Northern, Central, and Southern Provinces, Kirinde, Kalpitya, Jaffna, and Manar districts (Trimen).
Plains of India, Pegu, Tonkin, Cambodia.

6. **S. orientalis,** *Kunth, Enum. Pl.* i. 211 (1833).
*S. humifusus*, Trim. Cat. Ceyl. Pl. 108 (non Kunth).
Fl. B. Ind. vii. 251.

Very variable in habit, stoloniferous; stolons stout or slender, rooting at the nodes, and forming hard dense tufts with short convolute leaves, and slender geniculately ascending stems 4–8 in. high, or tall erect stems up to 18 in. high with very long flexuous convolute l. up to 14 in. long, root-fibres stout or slender, sometimes cylindric and tomentose with root-hairs; l. on the short stems 1–3 in. long, tapering from the base to the acute tip, on the tall stems, flat, $\frac{1}{5}$ in. broad, or convolute, coriaceous, smooth, or margins scaberulous, sheaths short or long, mouth hardly auricled, ligule a delicate membrane, ciliate with long hairs; spikelets $\frac{1}{10}$ in. long; glume I one-fourth to one-third of III, ovate, obtuse, hyaline, veinless; II and III firmer in texture, nearly equal in length, 1-veined, II ovate-lanceolate, obtuse, III ovate-oblong, obtuse, palea inflexed along the median line; stam. 3, anth. linear, half as long as the palea; grain broadly oblong, laterally compressed, tipped with the globose remains of the pericarp, quite smooth, yellow-brown.

North Central and North-western Provinces. Kalpitiya, and Islands (Trimen). Sea-shore, Chilan (Ferguson).

Also in the Deccan.

The specimens are insufficient for a satisfactory description. The grain is like that of *S. tremulus.*

7. **S. coromandelianus,** *Kunth, Revis. Gram.* i. 681 (1835).
Trim. Cat. Ceyl. Pl. 208.
Fl. B. Ind. vii. 14.

Annual, densely tufted; stems 3–6 in., copiously leafy at the base, erect, spreading or ascending, lower internodes short; l. 1–3 by $\frac{1}{8}$–$\frac{1}{6}$ in., narrowed from the subcordate base to the finely acuminate tip, margins setosely or subspinulosely ciliate towards the base with deciduous hairs, lower sheaths short, terete or compressed, upper long, smooth, mouth hardly auricled, ligule a narrow membrane, fimbriate with rather long fine hairs; panicle 1–1$\frac{1}{2}$ in. long, ovate or pyramidal, erect, rhachis filiform, smooth, branches capillary, in rather distant whorls of 3–6, horizontally spreading, naked at the base; sparingly shortly divided upwards, bearing short clusters of few, minute, red-brown, subsessile, caducous spikelets $\frac{1}{20}$ in. long; glumes hyaline, I minute, orbicular, veins 0, II as long as III, ovate-oblong, subacute, III oblong, obtuse, palea as long as the glume, oblong, acute, splitting between the closely approximate veins; stam. 2, anth. very short; grain broadly oblong or oval, laterally compressed, rounded at both ends, quite smooth, loosely enclosed in the rather fleshy reticulate pericarp, pale yellow-brown.

Southern Province at Kirinde, and Jaffna district at Punakari (Trimen).

Plains of India, Affghanistan, N. and S. Africa.

Whole plant much larger, and panicle up to 6 in. long in Indian specimens; and glume I variable in shape, often 1-veined.

## 48. CALAMAGROSTIS, *Adans.*

Erect, usually perennial grasses; l. narrow; spikelets in contracted or effuse panicles, not articulate on their pedicels, 1-fld., rhachilla articulate at the base, not produced beyond gl. III; glumes 3, I and II empty, acute, keeled, equal or upper longer, III much shorter, hyaline, truncate, 3-veined, dorsally awned, paleate, callus bearded, palea much shorter than the glume, hyaline; stam. 3; styles short, free, stigmas plumose; grain narrowly oblong, free within the glume.—Sp. 90 (many no doubt synonyms); 12 in *Fl. B. Ind.*

**C. pilosula,** *Hook. f. Fl. B. Ind.* vii. 263 (1896).

*Agrostis pilosula*, Trin. Agrost. ii. 372. *A. Royleana*, Trin. l. c. 371; Thw. Enum. 370. *A. zeylanica*, Klein ex Steud. Syn. Gram. 83. *Deyeuxia Royleana*, Trim. Cat. Ceyl. Pl. 108. (?) *Cal. Hookeriana*, Steud.

l. c. 192. *Lachnagrostis Hookeri and L. Hookeriana*, Nees ex Steud. l. c. 173, 192. C. P. 2394.
Fl. B. Ind. l. c.

A densely tufted grass, 1–3 ft. high, with fibrous roots; stems slender, quite smooth; l. 4–10 in., very narrow, acuminate, glabrous, slightly scaberulous, sheaths smooth, ligule erect, oblong, scarious, variable in length; panicle 4–6 in. long, erect, effuse, ovate, lax-fld., rhachis and capillary spreading branches smooth or faintly scaberulous, lower branches whorled, upper opposite, pedicels longer or shorter than the spikelets, capillary; spikelets $\frac{1}{10}$ in. long; glumes I and II, subequal, ovate, acute, keeled, glabrous, midrib strong, veins 0, III $\frac{1}{3}$ shorter than II, tip truncate, erose, ciliate with long hairs, veins 4 and a very short median terminating in a geniculate awn a little above the base, callus hairs short, awn about twice as long as the spikelet, palea half as long as its glume, oblong.

Central Province, alt. 6000–8000 ft. Spikelets green or purplish.
Himalaya and Nilgiri Hills.

In Fl. B. Ind. I have selected *pilosula* as the earliest name which I could confidently accept for this plant. The *Agrostis Royleana* of Trinius (C. Royleana, *Steud.*) was founded on a plant with a 'bearded continuation of the rhachilla,' which would place it in *Deyeuxia;* and *Cal. Hookeriana*, Steud., is described as having the palea as long as its glume, which I have not found to be the case in any specimen of the Ceylon plant, or in any Indian species of the genus.

## 49. **AVENA,** *L.*

Annual or perennial grasses; l. flat; spikelets panicled, terete or laterally compressed, 2- or more-fld., not articulate on their pedicels, rhachilla articulate at the base; glumes dorsally rounded, I and II empty, unequal, thin, persistent, awnless, flg. glumes all bisexual or the uppermost male or neuter, 5–9-veined, dorsally awned, awn geniculate, column twisted, palea 2-keeled; lodicules 2; stam. 3; ov. hairy at the tip, styles very short, stigmas penicillate with simple hairs; grain fusiform, furrowed.—Sp. over 150 (including *Trisetum*); 13 in *Fl. B. Ind.*

**A. aspera,** *Munro ex Thw. Enum. Pl. Ceyl.* 372.
C. P. 916.
Fl. B. Ind. vii. 277 (*aspera, proper*).

Perennial; stems tufted on a short rootstock, 2–4 ft. high, slender, glabrous, except the sometimes puberulous nodes; l. 6–10 by $\frac{1}{12}$–$\frac{1}{6}$ in., flaccid, smooth or faintly scaberulous, base obtuse, sheaths slender, smooth, upper very long, ligule short, membranous, lacerate; panicle 4–8 in. long, inclined, con-

tracted, subsecund, quite smooth, branches rather distant, erect, solitary, filiform, few-fld.; spikelets ½–⅔ in. long, suberect, oblong, 4–5-fld., upper fl. often imperfect, green, pedicels long or short, capillary, callus short and rhachilla bearded; glumes I and II unequal, glabrous, I lanceolate, acuminate, 1–3-veined, II much longer, narrowly oblong, acute, 3–5-veined, aristulate, flg. glumes narrowly oblong, scaberulous, about ⅓ in. long, strongly many-veined, tip 2-fid, lobes subulate, subaristulate, awn dorsal from about the middle of the glume, and as long to twice as long as the glume, rarely longer, column slightly twisted, palea narrow, keels shortly pectinately ciliate, tip 2-toothed; lodicules cuneately quadrate, truncate, retuse; grain free within the glume, linear-oblong, pubescent, top villous.

Montane region. Nuwara Eliya, Horton Plains, &c. Spikelets pale green.

Himalaya and Nilgiri Mts.

In some Indian specimens the leaves are broader, with the sheaths hairy, the panicles up to 16 in. long, and the glumes smooth or pubescent. I have not seen ripe grain in the Ceylon specimens; it is sulcate in Indian.

## 50. **ERIACHNE,** *Br.*

Slender, erect, tufted, usually perennial grasses, roots fibrous; l. very narrow, margins convolute; spikelets panicled, laterally compressed, 2-fld. (fl. both perfect), not articulate on the pedicels, rhachilla 0; glumes 4, I and II empty, chartaceous, lanceolate, many-veined, persistent, bases distant, III and IV equal and similar, narrowly lanceolate, coriaceous, villous, ending above (in the Ceylon species) in a long rigid awn, and below in a long villous acute callus, which is articulate at base of glume II, palea as long as glume, like it coriaceous and villous, margins strongly incurved ending in two rigid diverging awns; lodicules very minute, oblong, truncate, emarginate; stam. 3, anth. minute, didymous; ov. narrow, styles short, bases distant, stigmas penicillate, of simple hairs; grain linear, narrowed to the acute base, plano-convex with a keel on the flattened face, firmly enclosed in the thickened glume and palea.—Sp. 20; 2 in *Fl. B. Ind.*

**E. triseta,** *Nees ex Steud. Syn. Gram.* 237 (1854). **Pini tuttiri,** *S.* Trim. Cat. Ceyl. Pl. 108. *Aristida biflora*, Moon, Cat. 9. *Megalachne zeylanica*, Thw. Enum. 372, 444. C. P. 3247.

Fl. B. Ind. vii. 269.

Perennial; stems erect, 1½–2 ft. high, from a hard rootstock with long stout simple wiry flexuous roots, simple or

branched at the very base, rigid, smooth, internodes long, nodes glabrous; l. shorter than the stem, erect, filiform, quite smooth, sheath of lower short, of upper long, terete, smooth, coriaceous, mouth not auricled, ligule very short with long hairs; panicle 2–4 in., erect, quite smooth, rhachis filiform, branches few, distant, subsecund, solitary or the lower 2–3-nate, 1–2 in. long, bearing few long- or shortly pedicelled spikelets towards the tips only; spikelets erect, with the awns 1 in. long, narrow; glumes I and II lanceolate, with long acuminate membranous points, and broad membranous margins, many-veined, upper longest, as long as the flg. glumes, rhachilla 0 except the glabrous stout elongation of the pedicel of the spikelet between the insertions of the empty glumes; III and IV quite equal and similar, or awn of III longest, narrowly oblong-lanceolate, about $\frac{1}{4}$ in. long exclusive of the awns, narrowed at the tips into awns $\frac{1}{3}$–$\frac{1}{2}$ in. long, margins involute, closely embracing the linear palea, which branches at the top into 2 rigid diverging awns half the length of the awn of the glume or more, margins of palea involute, closely embracing the long red-brown grain.

Colombo; in Cinnamon Gardens, abundant. Spikelets green or purplish.

Also in Tenasserim.

### 51. **ZENKERIA,** *Trin.*

Tall, glabrous, perennial grasses; stems tufted, bases clothed with the fibrous remains of old sheaths; l. long, narrow; spikelets small, in effuse panicles with capillary branches, laterally compressed, 2-fld. (both fl. perfect), not articulate on the pedicels, rhachilla very short, bearded, not produced above the uppermost glume; glumes 4, rather unequal-sided, I and II subequal or upper longer, persistent, III and IV equal and similar, chartaceous, bearded with long hairs below the middle, terete, veins many, callus 0, palea shorter than the glumes, oblong, truncate, keels ciliate with long hairs; lodicules ovate, denticulate; stam. 3, anth. linear; styles short, free at the base, stigmas short, penicillate, hairs simple; grain (immature) narrowly oblong, base acute.—Sp. the following.

Glumes obtuse or subacute . . . . . . 1. Z. OBTUSIFLORA.
Glumes acute or acuminate . . . . . . 2. Z. ELEGANS.

1. **Z. obtusiflora,** *Benth. in Journ. Linn. Soc.* xix. 93 (1881).

Trim. Cat. Ceyl. Pl. 108. *Amphidonax obtusiflora*, Thw. Enum. 370. C. P. 3470.

Fl. B. Ind. vii. 270.

Stems 3–4 ft. or more, as thick as a goose-quill below, terete, solid, smooth, striate, nodes small, naked, internodes long, sheathed; l. 2 ft. by $\frac{3}{4}$–1 in., ensiform or narrowly oblanceolate, narrowed from far above the middle to the acuminate tip and below into a long, slender, stiff petiole, coriaceous, quite smooth on both surfaces, midrib vanishing upwards, margins nearly smooth; sheath long, terete, smooth, polished, coriaceous, mouth not auricled, ligule a brush of short hairs; panicle 6–8 in. long and broad, quite smooth, erect, branches capillary, much and loosely divided, spreading; spikelets about $\frac{1}{10}$ in. long and broad; glume I broadly obliquely ovate, mid-vein strong, lateral 2–3, very short, faint, II one-third longer, ovate, acute, 6-veined, III and IV broadly ovate-oblong, obtuse, 5–7-veined.

Western Province, at no great elevation. Ratnapura (*Thwaites*). Endemic.

Thwaites's specimens, gathered in 1855, are the only ones known, and they do not show the lower part of the stem.

2. **Z. elegans,** *Trin. in Linnæa*, xi. 150 (1837).

Trim. Cat. Ceyl. Pl. 108. *Amphidonax Heynii*, Nees; Thw. Enum. 370. C. P. 645.

Fl. B. Ind. vii. 270. Trin. l. c. t. 3.

Stems 2–3 ft., densely tufted, very slender, as thick as a crow-quill at the base, and there clothed with soft, matted, brown fibres, internodes very long, upper filiform, sheathed, nodes naked; l. very variable, shorter or longer than the stem, from narrowly linear with involute margins to $\frac{1}{4}$ in. broad above the middle, flat, tapering above into an acuminate pungent tip, below into a long very slender stiff channelled petiole, coriaceous, quite smooth on both surfaces and on the margins, midrib indistinct, upper sheaths very long, slender, smooth, mouth not auricled, ligule a very short brush of hairs; panicle 5–8 in. long, erect, quite smooth, ovate, lax-fld., rhachis filiform, branches alt., capillary, up to 3 in. long; spikelets $\frac{1}{8}$–$\frac{1}{6}$ in. long and broad, usually rather longer than their pedicels; glumes I and II ovate-lanceolate, acute or acuminate, midrib ending in a dorsal mucro, I 3-veined, II longest, 5-veined, III and IV lanceolate, acuminate, about 7-veined, villous with long hairs below the middle; grain narrowly clavate, base acute.

Central and Southern Provinces, up to 4000 ft. elevation. Hantane, Reigam Korale, Wallekelle.

Also in S. India and Burma.

### 52. **CŒLACHNE,** *Br.*

Very slender, flaccid, leafy, glabrous, marsh grasses; stem

erect, ascending, or creeping below; l. linear-lanceolate, flat or convolute and filiform; spikelets very small, in small panicles or interrupted spiciform racemes, 2-fld., not articulate on the pedicels, lower fl. perfect, upper fem., rachilla not articulate at the base, elongate and slender between the flg. glumes, not produced beyond the upper; glumes 4, I and II membranous, orbicular or broadly oblong, empty, persistent, faintly veined, II largest, III and IV flg., persistent on the rhachilla, thinly coriaceous, veins faint or 0, III cymbiform, dorsally rounded, margins strongly incurved, palea of the same texture, ovate, keel or veins 0 or very obscure, margins strongly incurved below, IV much smaller, flat or concave, keels of palea hispidly ciliate; lodicules 2, very minute; stam. 2 or 3, styles short, free, stigmas densely penicillate; grains fusiform or oblong, nearly terete, free within the glumes.—Sp. 2 or 3; regarded as vars. of one in *Fl. B. Ind.*

A very anomalous genus, perhaps allied to *Isachne*, to which a species was referred by Wight, but differing in the very persistent empty glumes, in the elongated rhachilla between the flg. glumes, and in the lower flower alone being always perfect. The species are very variable. After a re-examination of the Ceylon specimens of *C. pulchella* and *perpusilla* in the Peradeniya Herbarium, I find I was wrong in regarding these as varieties of one.

Spikelets in interrupted spiciform panicles . . . 1. C. PULCHELLA.
Spikelets in open panicles . . . . . . . 2. C. PERPUSILLA.

1. **C. pulchella,** *Br. Prodr.* 187 (1810).

Var. **simpliciuscula,** *Fl. B. Ind.* vii. 271 (1896). *C. simpliciuscula*, Munro in Benth. Fl. Austral. vii. 626 (in note). *C. pulchella*, Thw. Enum. 273. *C. brachiata*, Trim. Cat. Ceyl. Pl. 108. *Isachne simpliciuscula*, Wight and Arn. in Wight, Cat. n. 2044. C. P. 834.

Stems 8–12 in., erect; l. $\frac{1}{3}$–1 by $\frac{1}{8}$–$\frac{1}{4}$ in., linear-lanceolate, acuminate, flat, closely striate, above most minutely scaberulous, veinless, beneath glabrous, 5–7-veined, margins smooth, sheath glabrous, mouth not auricled, ligule a fringe of fine hairs; panicle 2–4 in., strict, erect, spiciform, 2–4 in. long, of subglobose clusters of sessile spikelets $\frac{1}{4}$ in. long or less, rarely the clusters are formed on very short lateral branchlets, rhachis of spike rather stout, quite smooth; spikelets globosely ovoid, about $\frac{1}{15}$ in. long, rarely very shortly pedicelled, straw-col'd., shining, rhachilla about half as long as the lower flg. glume; empty glumes about half as long as the lower flg. glume, orbicular, tips rounded, lower very membranous, upper less so, veins 3 or more, lower flg. glume shortly stipitate, globosely ovoid, obtuse, sometimes puberulous towards the

base, callus naked, palea ovate, margins incurved, keels 0 or very obscure, glabrous; anth. minute, shortly oblong, upper flg. glume oval, flat, glabrous or pubescent and ciliate, palea as large as the glume, keels strongly ciliate; grain of both flg. glumes very minute, fusiform, acute at both ends, pale yellow-brown.

Marshes in the Central Province, alt. 5000–8000 ft. Spikelets yellow-green.

Java, Tonkin, China, Madagascar.

The type (Australian) form of this plant is smaller, with very slender decumbent stems, an almost capillary sparingly branched panicle, and long-pedicelled spikelets, quite like those of the Ceylon variety.

2. **C. perpusilla,** *Thw. Enum.* 373 (1864).

*C. pulchella*, vars. *gracillima* and *Gardneri*, Fl. B. Ind. vii. 271. C. P. 130 (in part).

Stems 6–18 in., erect, densely tufted; l. $\frac{1}{2}$–1 by $\frac{1}{15}$–$\frac{1}{8}$ in., narrowly linear-lanceolate, acuminate, flat, closely striate, glabrous or puberulous above, veins 0 or obscure, sheaths membranous, hardly auricled, ligule a fringe of fine hairs; panicle ovate, branches few, filiform, smooth, spreading, bearing few sessile and pedicelled spikelets; spikelets $\frac{1}{10}$–$\frac{1}{7}$ in. long, ovate, coloured; empty glumes orbicular-ovate, I 1–5-veined, II 1–9-veined, III and IV ovate-lanceolate, III glabrous or puberulous, callus naked or bearded, palea oblong, faintly 2-veined, anth. half as long as the glume, linear, IV concave, dorsally rounded, margins ciliate below, callus densely bearded, palea linear, keels ciliate; grain oblong, dark red-brown, much larger than in *C. pulchella.*

Var. **muscosa,** *Hook. f. C. pulchella*, var. *perpusilla*, Fl. B. Ind. vii. 271. *Isachne perpusilla*, Wight and Arn. in Wight, Cat. n. 2043. C. P. 130 (in part).

Stems 3–4 in., densely compacted; l. $\frac{1}{4}$–$\frac{3}{4}$ in., filiform, convolute, mostly recurved; panicle depauperate, rhachis and branches capillary, flexuous; spikelets very few, sessile or pedicelled, coloured.

Marshes, alt. 5000–7000 ft. Var. *muscosa*, foot of Adam's Peak (Gardner), Havamitrya Patana (Trimen). Spikelets pale green or purplish.

The name *perpusilla* was adopted by Thwaites from Wight, who applied it to the dwarf state of the plant (var. *muscosa*), which he referred to *Isachne*. It is unfortunately misapplied to what is really, in its typical state, much the largest species of the genus, attaining 18 inches in height.

53. **OROPETIUM,** *Trin.*

A dwarf, very densely tufted, erect annual; l. short, filiform; spikelets very minute, 1-fld., semi-immersed in the

alternating cavities of the rhachis of an inarticulate tetragonal spike, sessile, not articulate on the rhachis, rhachilla articulate at the base, not produced beyond the flg. glume; glumes 3, I very minute, orbicular, hyaline, inserted at the base of the cavity of the spike, its sides partly embracing the base of II, which is much longer than the flg. glume, erect, herbaceous, linear, persistent (having the insertion and appearance of the lowest or outermost glume); flg. glume concealed by glume II, which closes the cavity in which the flg. glume is immersed, sessile, oval, hyaline, 1-veined, tip scaberulous, callus very short, bearded with long silky hairs, palea as long as the glume, keels close together, slender, smooth; lodicules very minute, obliquely cuneiform; stam. 3, anth. oblong; styles short, bases distant, stigmas plumose, laterally exserted; grain obovoid, terete, smooth, brown, free in the glume, tip bimucronate, embryo subbasal, small.—Monotypic.

The relative insertions and positions of glumes I and II are as explained under *Lepturus*, but in *Oropetium* the sides of I embrace the sides of the base of II. I follow Dr. Stapf (in Fl. Capens.) in referring the genus to *Chlorideæ* rather than to *Hordeaceæ*, where all other authors have placed it.

**O. Thomæum,*** *Trim. Fund. Agrost.* 98 (1820).
Thw. Enum. 363. *Rottboellia Thomæa*, Kœn.; Moon, Cat. 9. C. P. 872.
Fl. B. Ind. vii. 366. Trin. l. c. t. 3. Roxb. Cor. Pl. ii. t. 133 (*Rottboellia*).

Whole plant 2–3 in. high, forming hard tufts with capillary root-fibres; l. shorter or longer than the stem, erect or curved, filiform, acute, coriaceous, striate, sparsely ciliate with long hairs, sheath compressed, membranous, auricles small, bearded with long hairs, ligule an erect rather long lacerate membrane; spikes longer or shorter than the l., 1–1½ in. long, erect, straight or slightly curved, about $\frac{1}{30}$ in. diam., internodes about $\frac{1}{10}$ in. long; glume II longer than the internode, linear, obtuse, recurved.

Northern, N. Central, and Uva Provinces. Mannar, Anuradhapura, Bintenna tank (Gardner). On old walls (Ferguson).
Plains of India, Burma.
Moon gives Colombo as a habitat for this plant, as to which Ferguson remarks, 'I think he must have confounded it with *Stenotaphrum* or some other plant.'

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* The name derived from that of the town, St. Thomé (St. Thomas Mount), near Madras, where the plant was first found.

### 54. ENTEROPOGON, *Nees.*

Tall, perennial grasses; stem slender, erect, leafy; spikelets 2-fld., narrow, biseriate, secund, imbricate on a solitary, very long, slender, curved rhachis, not articulate at the base, rhachilla elongate between the flg. glumes, and produced beyond them, bearing a very imperfect awned neuter glume; glumes I and II narrow, membranous, hyaline, persistent, 1-veined, I much the shortest, II notched at the awned tip, III and IV flg., chartaceous, narrowly lanceolate, bicuspidate, 3-veined, awned below the tip, awn capillary, straight, callus bearded, articulate at the base, III bisexual or fem., IV male; palea narrow, bicuspidate; lodicules 2; anth. long, narrow; styles short, diverging from the base, stigmas short, laterally exserted; grain narrow, free within the glume and palea.—Sp. 3 or 4; 1 in *Fl. B. Ind.*

**E. melicoides,** *Nees in Lindl. Introd. Nat. Syst.* Ed. ii. 449 (1836). Trim. Cat. Ceyl. Pl. 109. *Ctenium seychellense*, Baker, Fl. Maurit. 452. Fl. B. Ind. vii. 284.

Stems 1–3 ft., erect, tufted on a short woody rootstock with stout root-fibres, as thick as a crow-quill, subsimple, smooth, shining, internodes long; l. nearly as long as the stem, $\frac{1}{6}$–$\frac{1}{4}$ in. broad, flat, narrowed into capillary tips, scaberulous on both surfaces and on the margins, midrib rather broad, pale, veins 4, very slender, sheaths long, ribbed, smooth, mouth auricled, auricles and ligule villous with very long hairs; spike 6–10 by $\frac{1}{6}$ in. broad across the spikelets, rhachis quite smooth, dorsally rounded; spikelets about $\frac{1}{4}$ in. long, erecto-patent; glumes I and II lanceolate, keels smooth, I aristulate, II twice as long, linear, awn short, III and IV equal and similar, very narrow, about $\frac{1}{3}$ in. long, strict, rigid, scaberulous all over, veins strong, awn $\frac{4}{10}$–$\frac{6}{10}$ in., palea as long as the glume, keels and back most minutely scaberulous; grain not seen.

Southern Province. Kirinde (Trimen).
Southern India and Burma, Seychelle Islds.

### 55. TRIPOGON, *Roth.*

Densely tufted grasses, stem erect, leafy chiefly at the base; l. very narrow, rigid, flat or convolute, spikelets few or many-fld., biseriate, secund, sessile on a slender, solitary, terminal rhachis, not articulate at the base, rhachilla produced between all the glumes, but not beyond them, slender, articulate at the base; glumes few or many, I and II unequal,

membranous, 1-veined, I deeply lobed on one side only, II longer, notched at the tip with a short awn in the sinus, flg. glumes 5–8, all but the uppermost perfect, terete, 3-cleft, 3-veined, side lobes awned, mid lobe entire or 2-cleft, awned in the sinus, awns all straight, callus short, bearded, palea narrow, complicate, truncate, keels ciliate; lodicules cuneate; stam. 3, anth. large, linear-oblong; styles distant at the base, stigmas short, plumose; grain narrow, free in the glumes.—Sp. 12; 11 in *Fl. B. Ind.*

**T. bromoides,** *Roth, Nov. Sp.* 49 (1821).

*T. zeylanicus*, Nees ex Wight Cat. n. 2360; Thw. Enum. 374. *T. festucoides*, Jaub. and Sp. Ill. Fl. Orient. iv. 49. C. P. 281. Fl. B. Ind. vii. 287. Jaub. and Sp. l. c. t. 333.

Perennial; stem 6–12 in., very slender, erect, naked above, thickened at the base, and with the bases of the l. clothed with matted brown fibres; l. very many, much shorter than the stem, erect, filiform, finely acuminate, quite smooth, glabrous or hairy, sheaths very short, mouth not auricled, ligule a narrow ridge, ciliate with long hairs; spikes 3–5 in. long by $\frac{1}{4}$–$\frac{1}{3}$ in. across the spikelets, erect, rhachis slender, smooth; spikelets $\frac{3}{10}$–$\frac{4}{10}$ in. long, distichously spreading, subimbricate or the lower distant, few- or many-fld., rhachilla glabrous; glume I cuspidate, narrow on one side of the midvein, very broad on the other side below the middle, and totally wanting above it (appearing as if the upper half of that side of the glumes was torn away), II oblong-lanceolate, tip entire or acutely bifid, with a short awn in the sinus, flg. glumes narrowly oblong, 4-fid, 3-awned, or 3-lobed, with the lateral lobes a little divergent truncate and awned, the mid lobe acutely bifid, with erect lobules and an interposed longer awn, awns all shorter than the glumes, callus villous with white hairs, keels of narrow palea silkily ciliate.

Elevated parts of the Central Province. Spikes greenish-brown.

Malabar Ghats.

A very variable plant in the Nilgiri and other hills, where the leaves are often as long as the stem, the flg. glumes more deeply cleft, and the awns sometimes as long as the glumes. The above description is from Ceylon specimens only.

### 56. **CYNODON,** *Pers.*

Perennial, glabrous, creeping grasses; l. narrow, flat; spikelets minute, 1-fld., sessile, unilateral, biseriate, and imbricate, in slender, strict, digitate spikes, not articulate at the base, laterally compressed; glumes 3, awnless, I and II

empty, ovate, stoutly 1-veined, persistent, or separately deciduous, III articulate at the base by a minute glabrous callus, ½-ovate, laterally compressed, subacute, smooth, veins 3, a median and two marginal, keel obtuse and tip scabrid or ciliate, margins incurved, ciliate above, palea nearly as long as the glume, linear-oblong, obtuse, keels 2, approximate, nearly smooth; lodicules 2, very minute; anth. short; styles short, bases close together, stigmas laterally exserted, short, plumose; grain free in the glume, fusiform.—Sp. 4; 1 in *Fl. B. Ind.*

**C. Dactylon,** *Pers. Syn.* i. 85 (1805). **Arugam-pillu,** *T.*
Thw. Enum. 371. C. P. 312.
Fl. B. Ind. vii. 288. Reichb. Ic. Fl. Germ. t. 26. Rheede, Hort. Mal. xii. t. 47.

Stem slender, prostrate, widely creeping, forming matted tufts, with slender erect or ascending flowering branches 3–12 in. high; l. 1–3 by $\frac{1}{20}$–$\frac{1}{8}$ in., narrowly linear or lanceolate, acuminate, soft, smooth, sheath of lower short, of upper long, ligule of a few hairs; spikes 2–5, radiating from the top of a very slender ped., 1½–2 in. long, rhachis compressed and angled, scaberulous; spikelets $\frac{1}{15}$–$\frac{1}{12}$ in. long and as broad.

Warmer parts of the Island, common. Spikes pale green.
All warm countries.
Widely known as Bermuda and Doob grass. A most useful tropical fodder, makes excellent hay, and sometimes a near approach to a sward.

## 57. CHLORIS, *Sw.*

Annual or perennial grasses; stems erect or decumbent below; l. flat or sides complicate; spikelets 1-fld., sessile or subsessile, secund, biseriate, imbricate in slender whorled digitate spikes, not articulate at the base, rhachilla produced much beyond the solitary flg. glume, terminated by one or more very small, imperfect, epaleate neuter glumes; glumes 3, I and II empty, membranous, 1-veined, persistent, III flg., broad or narrow, awned, concave, 3-veined, lateral veins near the margins, callus short, bearded, articulate at the base, palea narrow, 2-veined; lodicules 2, minute; stam. 3, anth. small; styles free, stigmas laterally exserted; grain linear-oblong, concavo-convex.—Sp. about 40; 11 in *Fl. B. Ind.*

Spikes 4–9 in. . . . . . . . . . 1. C. INCOMPLETA.
Spikes 1–3 in.
  Spikelets 3-awned . . . . . . . . 2. C. BARBATA.
  Spikelets 4-awned . . . . . . . . 3. C. MONTANA.

1. **C. incompleta,** *Roth, Nov. Sp.* 60 (1821).
*C. digitata*, Steud. Syn. Gram. p. 207. Thw. Enum. 371. C. P. 939.
Fl. B. Ind. vii. 290. Duthie, Fodd. Grass. N. India, t. 65 (*C. Roxburghii*).

Perennial; stem 2–3 ft., erect from a short rootstock, slender or rather stout, smooth, ending in a very long, slender, naked ped.; l. 6–12 by $\frac{1}{6}$–$\frac{1}{2}$ in., narrowed into very long points, flat, nearly or quite smooth above, beneath and margins scaberulous, base contracted, sheaths long, smooth, lower open, mouth auricled, ligule 0, or of a few hairs; spikes 4–6, whorled, 4–9 in. long, very slender, flexuous, rhachis filiform, scabrid; spikelets about $\frac{1}{6}$ in. long, imbricating, erect, closely appressed, rhachilla capillary, as long as the flg. glume or longer, scaberulous, slightly swollen about the middle; glumes I and II very unequal, midrib very stout, keels smooth, I very small, ovate, acuminate, II as long as III, lanceolate, acuminate, narrowed into a short, erect awn, III oblong, smooth, 3-veined, tip acute or 2-toothed, awned, awn $\frac{1}{5}$–$\frac{1}{3}$ in., capillary, palea as long as the glume, acuminate, keels nearly smooth; grain nearly as long as the glume, linear-oblong, compressed, concavo-convex, dark brown.

Hot drier parts of the Island. Spikelets green or coloured.
Plains of India, Burma, Andaman Islds., China.

2. **C. barbata,** *Sw. Fl. Ind. Occ.* i. 200 (1797). **Mayura tana,** *S.*
Thw. Enum. 371. Moon, Cat. 72. C. P. 954.
Fl. B. Ind. vii. 292. Jacq. Eclog. Gram. t. 8. Trin. Sp. Gram. Ic. t. 306. Rheede, Hort. Mal. xii. t. 51.

Perennial; stems tufted, with strong root-fibres, rather stout, 2–3 ft., ascending from a geniculate base, branching upwards, leafy, quite smooth, lower internodes 2–3 in., as thick as a crow-quill, shining, upper very long, slender, nodes often bearing equitant tufts of l.; l. 6–18 in., flat or complicate, narrowly linear, finely acuminate, nearly smooth, base contracted, sheaths smooth, lower open, upper closed, ligule obscure; spikes about 12, sessile, crowded in a truncate fascicle, rhachis very slender, flexuous, minutely scaberulous, base tomentose; spikelets densely imbricate, about $\frac{1}{10}$ in. long exclusive of the awns, rhachilla rather stout, shorter than the flg. glume, bearing two small, turgid, obcordate, awned, imperfect glumes; glumes I and II unequal, acuminate, III $\frac{1}{16}$ in. long, nearly orbicular, margins above the middle hirsutely bearded, as is a small dorsal area on each side of the midrib, awn $\frac{1}{6}$–$\frac{1}{3}$ in., rufous.

Common, especially near the sea, in the hotter parts of the Island. Spikes rufous.
All tropical countries.
A very variable grass. Continental Indian specimens have often

much larger spikelets. Ferguson describes it as being remarkable for its long-awned spikes, which come out in tufts of 12–20, and move with the least wind.

3. **C. montana,** *Roxb. Hort. Beng.* 82 (1814), Fl. Ind. i. 329.
*C. decora*, Thw. Enum. 371 (excl. syn. *C. barbata*). C. P. 958.
Var. *decora*, Trim. Cat. 109.
Fl. B. Ind. vii. 292.

Annual (?); stems 6–18 in., densely tufted, with slender root-fibres, erect or ascending from a geniculate base, leafy below, simple or branching upwards, lower internodes short, upper long, slender, naked or sheathed up to the spikes; l. 3–6 in., lower short, complicate, keeled, upper longer, very narrow, flat, smooth, lower sheaths short, open, upper closed, or uppermost spathiform, mouth sometimes ciliate, ligule obscure; spikes 2–6, connate at the base, erect, 1–2½ in. long, rhachis very slender, scaberulous and pilose, tomentose below, rhachilla very slender, shorter than the flg. glume, bearing 3 small obcordate turgid long-awned imperfect glumes; glume I ovate, acuminate, II much longer, linear-oblong, tip 2-lobed, shortly awned, III $\frac{1}{10}$ in. long, ovate-oblong tip minutely 2-toothed, margins hirsutely ciliate, dorsally quite glabrous, awn $\frac{1}{4}$–$\frac{1}{3}$ in., pale.

Var. **glauca,** *Hook. f.*

Stems 4–6 in., sheathed up to the spikes; l. all very short, complicate, keeled, keel sometimes winged, glaucous; spikes $\frac{2}{3}$–1 in.

Hot drier parts of the Island, common. Var. *glauca*, Jaffna, abundant (Trimen). Spikelets pale straw-coloured.
India from the Gangetic Plain southwards.
A very variable grass in India.

## 58. ELEUSINE, *Gaertn.*

Annual or perennial grasses; l. various; spikelets small, 3–10-fld., sessile, inarticulate at the base, 2–8-seriate, secund and closely imbricate on the under surface of alt., digitate, or whorled, rarely capitate spikes, strongly laterally compressed, rhachilla not or very shortly produced between the glumes, but not beyond them; glumes 5–12, keel muticous, cuspidate or shortly awned, I and II shorter than the flg., empty, persistent, I 1-veined, II 1–7-veined, flg. glumes gibbously ovate, acute, obtuse or shortly awned, tip entire or 2-toothed, 3-veined, callus 0, palea complicate, keels scabrid or ciliate; lodicules 2, very minute; anth. short; styles short, free, stigmas slender, laterally exserted; grain small, pericarp loose or evanescent, seed rugose.—Sp. few; 4 in *Fl. B. Ind.*

Spikelets pointing forwards, at an acute angle with the rhachis of the spike.
Spikes 1–5 in. long, whorled or racemose.
Glumes I and II with entire tips . . . 1. E. INDICA.
Glumes I and II with notched tips. . . 2. E. VERTICILLATA.
Spikes $\frac{1}{6}$–$\frac{1}{4}$ in., capitate . . . . . . 3. E. BREVIFOLIA.
Spikelets erect, at right angles to the rhachis of the spike . . . . . . . . 4. E. ÆGYPTIACA.

1. **E. indica,** *Gaertn. Fruct.* i. 8 (1788). **Wal-mal-kunakan,** *S.*
Thw. Enum. 371. Moon, Cat. 9. C. P. 937.
Fl. B. Ind. vii. 293. Burm. Fl. Zeyl. t. 47, f. 1. Rheede, Hort. Mal. xii. t. 69.

Annual; stems 1–2 ft., tufted, short, erect, slightly compressed, glabrous, roots of strong fibres; l. bifarious, as long as the stem, $\frac{1}{8}$–$\frac{1}{6}$ in. broad, narrowly linear, flat, rather flaccid, glabrous or sparsely hairy, margins nearly smooth, base not contracted, sheath compressed, mouth not auricled, ligule a ridge of hairs; spikes 2–7, digitate with sometimes 1 or 2 detached, 2–5 in. long, suberect or slightly recurved, axils glandular and hairy, rhachis slender, dorsally flattened, smooth, margins minutely scaberulous, bearing 2- or more-seriate spikelets from base to tip; spikelets very variable in size, $\frac{1}{12}$–$\frac{1}{6}$ in., 3–5-fld., sessile, pointing forward; glumes rather membranous, I oblong-ovate, acute, keel scabrid, II twice as large, acute or mucronate, keeled, with 1–7 green median veins, keel quite smooth, flg. glumes ovate, obtuse acute or acuminate, keel hardly scaberulous upwards, lateral veins very slender, keels of palea faintly scabrid; grain oblong, obtusely trigonous, pericarp loose, hyaline, seed tubercled in waved concentric ridges.

Common, especially on road-sides. Spikes pale green.
Tropics of Old World; introduced into the New.
The *E. coracana*, Gaertn. Fruct. i. 8, t. 1; Trim. Cat. 109, the Sinhalese '*Kurrakan*,' whence the name *coracana*, is a very stout prolific form of this, with the spikelets crowded in many series, and a globose rugose seed. It is extensively cultivated for its grain in Ceylon (as in all parts of India), up to 2500 ft., and is known as Marua in Bengal, Kaivarii or Kelvaragu in Tamil, and 'Raggi' in Madras.
Ferguson describes it as the most prolific of cultivated grasses. One variety, *E. stricta*, Roxb., giving the increase of 120-fold; another 500-fold; whilst on two tufts, the produce of one seed, 56 stems grew; no less than 8100-fold of grain was carefully calculated to have been the produce of this plant. Two varieties are cultivated by the Sinhalese.

2. **E. verticillata,** *Roxb. Hort. Beng.* 8, *Fl. Ind.* i. 346 (1832).
*E. racemosa*, Heyne in Roth, Nov. Sp. 80.
Fl. B. Ind. vii. 295 (not then known from Ceylon). Duthie, Fodd. Grass. N. Ind. t. 70.

Annual, glabrous; stems 1–3 ft., tufted, erect, slender,

quite smooth, branching, leafy, branches erect, root-fibres wiry; l. much shorter than the stem, erect, linear-lanceolate, acuminate, up to ¼ in. broad, flat, thin, flaccid, surfaces and margins nearly quite smooth, base rounded, sheaths mostly shorter than the internodes, slender, smooth, auricles at mouth small, ligule a ridge of short hairs; spikes few, 1–2½ in., scattered towards the top of a slender peduncle, solitary, opposite or terminal and digitate, rhachis very slender, trigonous, angles minutely scaberulous, bearing 2 rows of sessile, imbricating spikelets from base to tip; spikelets ovate or oblong, ⅙–¼ in. long, pale green, 6–12-fld.; glumes membranous, spreading, I and II 1-veined, keels smooth, tips toothed, I oblong-ovate, cuspidate, II larger, ovate, awn half as long as the glume, flg. glumes sessile on a very short glabrous rhachilla, ovate-oblong, ⅛–⅙ in. long, tip entire or notched, veins slender, median ending in a short straight awn, palea shorter than the glume, keels faintly scabrid; grain very small, oblong, pericarp evanescent, seed rugose.

Uva Province; Ella Pass (Trimen). Spikes green.

Tropical Asia, Africa, and Australia.

A common plant in the plains of India. It is remarkable that but one habitat for it should have hitherto been found in Ceylon.

3. **E. brevifolia,** *Br. in Wall. Cat.* n. 3815 (1828).

*Eragrostis brevifolia*, Benth. in Hook. Ic. Pl. xiv. 51 in nota. Trim. Cat. Ceyl. Pl. 109. *Dactylis brevifolia*, Kœn.; Roxb. Fl. Ind. i. 341. C. P. 3250.

Fl. B. Ind. vii. 295 (not given from Ceylon). Trin. Fund. Agrost. t. 12 (*Æluropus lævis*).

Annual, glabrous; stems many, spreading from the root and ascending from a decumbent base, 3–7 in. high, simple and slender, or sometimes more robust and proliferously branched, leafy, internodes except the terminal short, root-fibres capillary; l. short, ½–2 in., rarely longer, ⅛–⅙ in. broad, linear, acute, flat, smooth or scaberulous, base rounded or subcordate; sheaths compressed, mouth hardly auricled, ligule a short, hyaline, ciliate membrane; spikes many, ⅙–¼ in. long, sessile in a dense globose head ⅓–⅔ in. diam., rarely reduced to two; spikelets 2-seriate, sessile, ⅛–⅙ in. long, ovate or oblong, 4–10-fld.; glumes I and II membranous, glabrous, ovate-oblong, acuminate, shortly awned, I 1-veined, keel scabrid, II larger, 3–7-veined, keel smooth, flg. glumes ovate, acute, cuspidate, veins densely villously bearded below the middle, palea oblong, truncate, villously ciliate; seed very small, from broadly oblong or nearly orbicular to ovate or ovate-cordate, concavo-convex, trans-

versely rugose, red-brown, pericarp hyaline, more or less persistent.

Northern Province (Moon); near Mantai (Trimen). Southern Provinee; near Bundala, and Tissa-maha-rama Tank (Trimen). Spikes green.

Sandy shores of Coromandel and the Carnatic.

A single specimen in Herb. Peraden., collected by Moon, bears the number C. P. 3250, which is omitted in the 'Index of C. P. numbers' appended to Thwaites's Enumeratio, as it is in the body of the work. It has been referred to seven genera, and received fifteen names. It resembles, in inflorescence, *Æluropus villosus.*

4. **E. ægyptiaca,** *Desf. Fl. Atlant.* i. 85 (1798).

Trim. Cat. Ceyl. Pl. 109. *Dactyloctenium ægyptiacum,* Willd. Enum. Hort. Berol. 1029; Thw. Enum. 371. C. P. 941.

Fl. B. Ind. vii. 295. Duthie, Fodd. Grass. N. Ind. t. 35. Rheede, Hort. Mal. xii. t. 69.

Annual, very variable in habit; stems many, spreading from the crown, decumbent and rooting below, then ascending and either slender, subsimple, and 12–18 in. high, or very short, stout, copiously di-, trichotomously branched, the branches often prostrate, short, divaricate, leafy, roots capillary; l. in tall stems 4–6 in., narrowly linear, acuminate, flaccid, flat, smooth, in short robust specimens $\frac{1}{2}$–1 in., subulate-lanceolate, rigid, glabrous or ciliate towards the rounded, subcordate, or simple base, margins nearly smooth, sheaths compressed, long in slender states, very short and often inflated in short-leaved states, upper sometimes spathiform, ligule obscure; ped. long and slender to very short and stout, sometimes shorter than the upper l.; spikes 2–5, digitately radiating from the top of the ped., under $\frac{1}{2}$–1 in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. diam. across the spikelets, rhachis narrow, trigonous or dorsally flattened, rigid, smooth or puberulous, sometimes excurrent in a pungent mucro; spikelets innumerable, 3–4-fld., many-seriate, $\frac{1}{10}$–$\frac{1}{8}$ in. long and broad, densely crowded at right angles to the rhachis, 3–4-fld., very strongly compressed, rigid, base bearded, rhachilla hardly any; glumes divaricate, I and II 1-veined, I oblong, cymbiform, acute or obtuse, II broadly oblong, turgidly cymbiform, deeply 2-lobed, awned between the lobes, awn as long as the glume or shorter, rigid, flg. glumes gibbously ovoid, tip notched with a pungent often recurved mucro, keel smooth or minutely scabrid, side veins 0, palea shorter than the glume, ovate-oblong, obtuse or 2-toothed, keels scabrid or hispidulous; anth. minute; styles short; seed orbicular, tubercled, retaining the hyaline pericarp when ripe.

Common in the warmer parts of the Island. Spikes green or coloured.

Warm regions of the Old World; introduced into the New.
A very common weed, varying greatly with the nature of the soil.

### 59. ***DINEBRA,** *Jacq.*

An annual leafy grass; l. flat; spikelets 2–3-fld., biseriate secund and imbricating in short spikes which are biseriate and articulate on the spiciform branches of a pyramidal racemiform panicle, strongly laterally compressed, rhachilla slender, articulate at the base and between the flg. glumes; glumes 4–5, uppermost often neuter, I and II subequal, lanceolate, narrowed into slender awns, hyaline, keeled, empty, persistent, flg. glumes much smaller than the empty, membranous, ovate-oval, obtuse, keeled, mid-vein slender, lateral veins very short, near the margins or 0, keel ciliate with very fine hairs, callus 0, palea shorter than the glume, linear-oblong, obtuse, keels delicately ciliolate; lodicules 2, minute; stam. 3, anth. minute, didymous; styles free, short, stigmas exserted at the top of the glume, shortly penicillate; grain narrowly ovoid, obscurely trigonous.—Monotypic.

***D. arabica,** *Jacq. Fragm.* 77 (1809).
Trim. Cat. 109. *Eleusine calycina*, Roxb. Fl. Ind. i. 346.
Fl. B. Ind. vii. 296. Beauv. Agrost. t. 16.

Stems 1–3 ft., tufted, stout or slender, erect or geniculately ascending, leafy throughout, nodes glabrous; l. 3–8 by $\frac{1}{8}$–$\frac{1}{6}$ in., linear, finely acuminate, flaccid, glabrous or sparsely hairy above, base rounded, contracted at the insertion, sheaths thin, loose, mouth not auricled, ligule a narrow lacerate membrane; panicle 4–12 in. long, erect, branches $\frac{1}{2}$–2$\frac{1}{2}$ in. long, alt. or whorled, slender, strict, spreading or deflexed; spikes of spikelets very many, $\frac{1}{3}$–$\frac{2}{3}$ in. long, rhachis dorsally flattened, ventrally trigonous, with an acute central ridge, which is hollowed opposite each spikelet, margins green, scaberulous; spikelets alternate, sessile, $\frac{1}{6}$–$\frac{1}{5}$ in. long, with the awns closely appressed to the rhachis, and somewhat sunk in its hollow; awns of the empty glumes slightly recurved, minutely scaberulous, flg. glumes $\frac{1}{15}$ in. long, white; grain pale yellow-brown, surface rather rough, embryo narrowly oblong.

Near Colombo, common, but introduced (Ferguson). Panicle pale green.

All India, Afghanistan, and westward to Senegal.

This common Indian plant is sure to spread widely in Ceylon. It may be an overlooked native.

### 60. **DICHÆTARIA,** *Steud.*

A tall, glabrous, slender, perennial grass; l. long, narrow,

flat; spikelets 1-fld., distantly scattered along the very long filiform rhachis and short branches of a contracted panicle, very narrow, terete, not articulate on the short pedicels, rhachilla filiform, produced much beyond the flg. glume as a filiform awn bearing a minute glume below the middle; glumes 3, I and II equal or unequal, lanceolate, acuminate, 3-veined, empty, separately deciduous, II subaristate, flg. glume much longer than the empty, very narrow, 3-veined, bifid with a long recurved awn in the sinus, callus elongate, bearded, palea as long as the glume, very narrow, finely acuminate, 2-veined, tip quite entire or minutely 2-toothed, veins approximate; lodicules cuneiform, fleshy; anth. very long, slender; styles short, meeting at the base, stigmas long, laterally exserted, penicillate with short simple hairs; grain very narrow.—Monotypic.

**D. Wightii,** *Nees ex Steud. Syn. Gram.* 145 (1854).
*Gymnopogon rigidus*, Thw. Enum. 372, 444. C. P. 914.
Fl. B. Ind. vii. 300.

Stems 2–3 ft., erect from a hard creeping rootstock, smooth; l. chiefly radical, as long as the stem, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, smooth, finely acuminate, base narrowed, margins scaberulous, midrib faint, upper sheaths very long, auricles pubescent, ligule a minute membrane; panicle 12–18 in. long, quite glabrous, spiciform in the upper part, rhachis rather stout, terete, branches few, distant, erect, with few, sessile, erect spikelets, lower 2–4 in. long; spikelets with the rigid recurved awns 1$\frac{1}{4}$–1$\frac{1}{2}$ in. long, green; glumes all rigid, I and II contracted at the base, quite smooth except the scaberulous keel of I, which is usually much the shortest, flg. glume about $\frac{1}{2}$ in. long, minutely scaberulous, veins strong, lateral ending in the teeth of the glume, awn scaberulous below, rigid, palea as long as the glume, quite smooth except the very minutely scabrid strong veins.

Dry region, in the Southern and Western Provinces. Spikelets green.
Southern India.

### 61. LEPTOCHLOA, *Beauv.*

Tall, usually very slender, annual grasses; l. flat or involute; spikes very small or minute, 1–8-fld., alternate, secund in two series on the spiciform very slender branches of a simple panicle, sessile or pedicelled, not articulate at the base, rhachilla produced between the flg. glumes but not beyond

the upper, articulate at the base; glumes membranous, I and II oblong or lanceolate, 1-veined, keeled, II longest, flg. glumes 1–6, all perfect or upper neuter, ovate, subacute or obtuse, 3-veined, not awned, veins often ciliate, lateral submarginal, palea nearly as long as the glume, 2-keeled; lodicules 2, cuneate; stam. 2–3; styles free to the base, stigmas short, plumose, laterally exserted; grain loose or cohering with the palea, oblong-fusiform, compressed or trigonous, pericarp loose or adnate to the seed.—Sp. uncertain; 5 in *Fl. B. Ind.*

Spikelets 1-fld.
  Empty glumes linear-lanceolate . . . . . 1. L. UNIFLORA.
  Empty glumes oblong . . . . . . . 2. L. POLYSTACHYA.
Spikelets 2–6-fld.
  Spikelets 2–3-fld. . . . . . . . . 3. L. FILIFORMIS.
  Spikelets 4–6-fld. . . . . . . . . 4. L. CHINENSIS.

1. **L. uniflora,** *Hochst. ex A. Rich. Tent. Fl. Abyss.* ii. 409 (1847–51). Trim. Cat. Ceyl. Pl. 109. *Cynodon gracilis*, Nees; Thw. Enum. 371. C. P. 2948.
Fl. B. Ind. vii. 297. (?) Burm. Fl. Ind. t. xi. f. 1 (*Poa chinensis*).

Stem 1–2 ft., very slender, simple or branched, ascending, often geniculately, from a shortly decumbent base, lower internodes short, upper long; l. 1–3 by $\frac{1}{2}$–$\frac{2}{3}$ in., oblong-lanceolate, acuminate, membranous, flaccid, translucent, smooth on both surfaces, midrib and 2–3 pairs of veins very slender, base very narrow, margins scaberulous, sheaths smooth, mouth not auricled, ligule short, membranous; panicle 6–8 in., rhachis filiform, smooth, branches 2–3 in., rather distant, spreading, capillary, flexuous; spikelets 1-fld., rather distant, $\frac{1}{20}$–$\frac{1}{16}$ in. long, sessile; empty glumes narrowly lanceolate, subaristately acuminate, keel scaberulous flg. glume shorter than the empty, hyaline, ovate, acute, lateral veins marginal, margin and keel and keels of palea ciliate with long hairs; anth. 2, large, oblong; grain fusiform, obtusely trigonous, acute, rugulose, as long as the palea and adherent to it.

Drier parts of the Island; common. Fl. all seasons.
Also in Tinnevelly, Afr. Trop.
This differs from its congeners in the long narrow empty glumes.

2. **L. polystachya,** *Benth. Fl. Austral.* vii. 617 (1878).
*L. Neesii*, Benth.; Trim. Cat. Ceyl. Pl. 109. *Cynodon Neesii*, Thw. Enum. 371. C. P. 3749.
Fl. B. Ind. vii. 298.

Stem 2–3 ft., rather stout, erect from a short creeping rootstock with stout root-fibres, nodes glabrous or sparsely bearded, internodes polished; l. 12–18 by $\frac{1}{8}$–$\frac{1}{6}$ in., narrowly

linear, acuminate, flat or complicate, coriaceous, smooth on both surfaces and margins, sheaths smooth, keeled, mouth not auricled, ligule short, membranous, lacerate; panicle 6–10 in., contracted, rhachis filiform, smooth; spikes $\frac{3}{4}$–1$\frac{1}{4}$ in., very slender, internodes of rhachis short, appearing pectinate from the spreading glumes of the imbricating spikelets; spikelets 1-fld., $\frac{1}{20}$–$\frac{1}{16}$ in., subsessile; glumes I and II oblong, acute, keels scabrid, flg. glume as long as II, ovate, acute, hyaline, nearly orbicular when spread out, base bearded, lateral veins marginal, and keels of oblong palea ciliate with long flexuous hairs; anth. small; grain oblong, concavo-convex, rugulose, red-brown, pericarp closely adnate to the seed.

Hot parts of the Island, Trincomalie and Batul Oya (Glenie), Dambulla (Thwaites), Tissa-maha-rama Tank (Trimen). Spikelets red-brown.
The Carnatic, Australia.

3. **L. filiformis,** *Beauv. Agrost.* 71 (1812).
Thw. Enum. 371. C. P. 3245.
Fl. B. Ind. vii. 298. Jacq. Eclog. Gram. t. iv. (*Eleusine*). Duthie, Fodd. Grass. N. Ind. t. 71 (*Eragrostis chinensis*).

Stems many, 1–2 ft., very slender, geniculately ascending from the capillary root-fibres, leafy; l. 4–6 by $\frac{1}{8}$–$\frac{1}{6}$ in., narrowed from the middle to the finely acuminate tip and to the rounded base, flat, thin, flaccid, scaberulous on both surfaces and on the margins, midrib and veins very slender, sheaths smooth, mouth shortly auricled, ligule a hyaline membrane fringed with long hairs; panicle 4–6 in., rhachis filiform, flexuous, smooth; spikes many, 1$\frac{1}{2}$–2$\frac{1}{2}$ in., capillary; spikelets loosely imbricate, $\frac{1}{20}$–$\frac{1}{15}$ in. long, 2–3-fld., subsessile or shortly pedicelled, rhachilla produced between the flg. glumes, very slender; glumes I and II shorter than the flg., oblong, mucronate, keels scaberulous, flg. glumes oval, mucronulate at the obscurely truncate tip, veins naked or ciliate, lateral rather far from the margins, palea oblong, obtuse, keels ciliate; anth. minute; grain broadly oblong, dorsally compressed and obscurely keeled, rugulose, red-brown.

Colombo, formerly in the garden of the Govt. offices, but has disappeared (Ferguson). Spikelets green.
Tropical Asia, Africa, and America.
A plant so common in India as to suggest its having been overlooked in Ceylon.

4. **L. chinensis,** *Nees in Syll. Ratisb.* i. 4 (1824).
Thw. Enum. 371. Moon, Cat. 8. C. P. 3748.
Fl. B. Ind. vii. 299. Duthie, Fodd. Grass. N. Ind. t. 71.

Stem 2–4 ft., erect or geniculately ascending from a short creeping rootstock, with stout root-fibres, stout or slender,

leafy, internodes rather soft; l. 6–18 by $\frac{1}{6}$–$\frac{1}{4}$ in., narrowly linear, finely acuminate, flat or convolute, rather coriaceous, surfaces and margins nearly smooth, base not contracted, sheaths long, smooth, lower often broad, open, spathiform, mouth hardly auricled, ligule a hyaline membrane fringed with long hairs; panicle 6–18 in., rather contracted, rhachis flexuous, scaberulous; spikes 2–5 in., capillary, rather crowded, flexuous; spikelets $\frac{1}{10}$–$\frac{1}{6}$ in. (if smaller, imperfect), 4–8-fld., shortly pedicelled, rhachilla produced between the flg. glumes; glumes I and II oblong, obtuse or apiculate, I much the smallest, flg. glumes ovate-oblong, obtuse, apiculate, lateral veins submarginal, and keels of broadly oblong palea silkily ciliate; anth. very small; grain oblong, concavo-convex or obtusely trigonous, ventral face concave, rugulose, red-brown.

Atakalam Korale and Doombera (Thwaites), Uma-oya (Trimen). Tropical Asia, Australia.

### 62. GRACILEA, *Kœn.*

Small, tufted grasses; l. short; spikelets 2-fld., collected in turbinate fascicles, which are secund sessile and articulate on a slender spike, not articulate at the base, callus 0, rhachilla produced far beyond the upper glume, filiform, scaberulous; glumes 4, I and II much the longest, empty, elongate-subulate, rigid, collateral at the base and laterally attached to the base of the spikelet, persistent, III bisexual, chartaceous, ovate-oblong, cymbiform, shortly awned, 3-veined, palea as long as the glume, bicuspidate, keels scaberulous; lodicules minute, cuneiform, truncate, anth. large, IV like III but much smaller, bicuspidate, male, anth. small; styles slender, free at the base, stigmas slender, laterally exserted, hairs short, simple; grain linear-oblong, free within the glumes.—Sp. 2; both in *Fl. B. Ind.*

A very curious genus of two species, the other a native of the Panjab, &c.

**G. nutans,** *Kœn. in Ges. Naturf. Fr. Neue Schrift.* iv. 218 (1803). *Melanocenchris Rothiana*, Nees.
Fl. B. Ind. vii. 283. Jaub. and Sp. Ill. Pl. Orient. iv. t. 326 (*Mel. Perrottetii*).

Perennial; stem stout below, shortly creeping, with stout fibrous roots, then ascending, 4–12 in. long, stout and leafy below, very slender and naked above; l. $\frac{1}{3}$–1 by $\frac{1}{8}$–$\frac{1}{6}$ in., narrowed from the rounded base to the obtuse tip, coriaceous, striate, margins ciliate below the middle with tubercle-based

hairs, striate, glaucous, midrib obscure, naked or sparsely ciliate, sheaths shorter than the blade, coriaceous, open above, white, ligule a ridge of hairs; spike 1–2 in., of 4–10 distant sessile obconic fascicles of 4–6 spikes, rhachis of spike flexuous, smooth, fascicles spreading or drooping, $\frac{1}{8}$–$\frac{1}{6}$ in. long, rhachis of fascicles ending in 3 subulate empty glumes; spikelets closely appressed; glumes I and II empty, about $\frac{4}{10}$ in. long, rigidly coriaceous, gradually narrowed from a villous base into an erect scabrid pungent awn, II with broad hyaline margins towards the base, III articulate at the naked base, about $\frac{1}{10}$ in. long, scaberulous above the middle, tip entire or minutely 2-toothed at the base of the short, strict, scabrid awn, IV not articulate on the short, stout, smooth, glabrous rhachilla, about half as large as III, more scaberulous, terminated by 2 strong teeth and a short awn, slender prolongation of the rhachilla rather thickened upwards, as long as the glumes or longer.

Mannar district, on the dry mud of tidal flats (Trimen). Spikelets pale green.

Mysore and the Carnatic.

63. **POMMEREULLA,** *Linn. f.*

A dwarf stoloniferous grass; stems short, erect or ascending, clothed to the base with equitant l. sheaths; l. linear; infl. a terminal simple or forked flattened rhachis, bearing at the apex a turbinate fascicle of biseriate, sessile, strongly dorsally compressed, cuneiform, 2–3-fld. spikelets, which are inarticulate at the base; glumes many, I and II narrow, membranous, I 1-veined, II 3-veined, III–VII or VIII coriaceous, spirally inserted by a $\frac{1}{2}$ amplexicaul base round a stout rhachilla that terminates downwards in a long, subulate, villous callus with a pungent articulate base, III and IV empty, epaleate, embracing the upper, flabelliform, 3-lobed to the middle, dorsally shortly awned, side lobes broadly ovate, spreading and recurved, mid lobe smaller, entire or bifid, V and VI more like II and III, but with the mid lobe hooded, bisexual and paleate, the uppermost imperfect, palea membranous, ovate, acuminate, keels slender, ciliolate; lodicules 2, cuneiform; stam. 2–3, anth. minute, short; ov. obcordate, styles short, bases distant, stigmas very short, laterally exserted; grain loose in the glume and palea, broadly oblong, biconvex or concavo-convex, pericarp loose, hyaline, hilum punctiform, embryo orbicular.—Monotypic.

**P. Cornucopiæ,** *Linn. f. Nov. Gram.* 31 (1779).
Trim. Cat. Ceyl. Pl. 109.
Fl. B. Ind. vii. 30. Roxb. Pl. Corom. t. 131.

Stolons several inches long, as thick as a crow-quill, stiff, polished, rooting at the nodes; stems 2–6 in., stout, internodes much shorter than the sheaths; l. 1–3 by $\frac{1}{12}$–$\frac{1}{8}$ in., truly linear, erect or recurved, tip rounded, striate, coriaceous, veins obscure, base complicate, margins smooth glabrous or ciliolate, sheaths equitant, short, strongly compressed, margins hyaline, mouth not auricled, ligule a pubescent ridge; spikes usually half sunk in the uppermost spathiform l.-sheath, ped. 1–3 in. long, rhachis narrow, dorsally compressed, margins smooth or scaberulous; spikelets about $\frac{1}{3}$ in. long; glumes I and II glistening, I linear or very narrowly lanceolate, acuminate, II one-third longer, acuminate or aristulate, rhachilla half as long as the glumes, which are firmly attached to it, silkily villous, awn about twice as long as the glume, uppermost flg. glumes with narrow lateral lobes, or reduced to a flg. or neuter mid lobe; grain red-brown.

Mannar district, between Vedatativu and Mantai (Trimen). Spikes green.

Also in Mysore and the Carnatic.

One of the most curious of Indian grasses, of doubtful affinity. All the glumes in the spikelet are sometimes neuter. The glumes are so firmly attached to the rhachilla as to require force to remove them; the latter, disarticulating by its pointed base, carries away with it all the glumes except the persistent I and II.

### 64. PHRAGMITES, *Trin.*

Tall, perennial, gregarious grasses, with creeping, stoloniferous rootstocks; stems stout, hollow, leafy upwards; l. long; infl. a decompound panicle; spikelets 2- or more-fld., pedicelled, not articulate at the base, laterally compressed, fan-shaped when expanded, rhachilla elongate between all the glumes, disarticulating above glume III, and between the flg. glumes, penicillate with very long silky hairs, articulate at the base; glumes all membranous, very narrow, shining, I and II empty, distant at the base, very unequal, oblong-lanceolate, persistent, I 1-veined, II 3-veined, III much longer, narrowly linear-lanceolate, acute, 3-veined, male or neuter, persistent, IV and following glumes bisexual or uppermost imperfect, subulate-lanceolate, finely acuminate, hyaline, 3-veined, disarticulating with the rhachilla, palea much shorter than its glume, very narrow, 2-keeled; lodicules 2, obliquely cuneate; stam. 1–3, anth. very large;

styles very short, free, stigmas short, densely penicillate, exserted at the sides of the spikelet; grain terete.—Sp. (?); 2 in *Fl. B. Ind.*

**P. Karka,** *Trin. ex Steud. Nom.* Ed. II. ii. 324 (1841). **Nalagas,** *S.*
*P. Roxburghii,* Steud.; Thw. Enum. 370. C. P. 304.
Fl. B. Ind. vii. 304 (not given for Ceylon).

Stems 8–12 ft. high, smooth, simple or branched, covered with the l.-sheaths; l. close together, bifarious, sword-shaped, finely acuminate, up to 1½ in. broad, coriaceous, quite smooth, veins indistinct, base contracted, margins smooth, sheath coriaceous, mouth not auricled, ligule 0; panicle 1–2 ft., erect, oblong, branches widely spreading, alt., filiform; pedicels capillary, quite smooth; spikelets when fully expanded about ½ in. broad across the glumes; glume II ⅕ in. long, twice as long as I, flg. glumes about ⅓ in. long, gradually tapering from the base to the apex, palea $\frac{1}{10}$ in. long, keels smooth; anth. linear-oblong; ov. minute.

Banks of canals and streams; common. Spikelets greyish-green.
Trop. and Subtrop. Asia, Africa, and America.
Ferguson describes the rootstock as 75 ft. long in the Bolgoda lake. Pipes are made of the stems, of which, when split open, the Durma mats of Bengal are made.

### 65. ELYTROPHORUS, *Beauv.*

An annual, erect, glabrous grass; l. very narrow, flat; infl. of globose clusters of most minute sessile spikelets, crowded together in long cylindric continuous or interrupted catkin-like spikes, or rarely on the short spike-like branches of a very contracted raceme; spikelets short (many imperfect, or reduced to empty glumes), strongly laterally compressed, not articulate at the base, 4–6-fld., rhachilla very short, articulate at the base and between the flg. glumes, but not beyond the upper; glumes I and II subequal, lanceolate, aristately acuminate, empty, hyaline, 1-veined, glabrous or ciliate, keeled, flg. glumes rather larger, ovate, long-awned, strongly 3-veined, margins ciliate, uppermost neuter, palea shorter than the glume, very broad, truncately 3-lobed, lobes ciliate, keels distant, winged, smooth; lodicules 2, obliquely oblong; stam. 1–3, anth. minute; styles free, long, stigmatic hairs very short; grain minute, fusiform or narrowly oblong, free, pericarp loose at both ends.—Monotypic.

**E. articulatus,** *Beauv. Agrost.* 64 (1812).
Thw. Enum. 374. C. P. 935.
Fl. B. Ind. vii. 306. Beauv. l. c. t. 14, f. 2. Duthie, Fodd. Grass. N.W. Ind. t. 72.

Stem 6–30 in., erect from the densely fibrous root, as thick as a crow-quill or less; l. longer or shorter than the stem, $\frac{1}{10}$–$\frac{1}{8}$ in. broad, smooth, flaccid, base narrow, sheaths membranous, loose, mouth not auricled, ligule 0; infl. 6–12 in. long, often longer than the rest of the plant, rhachis strict, balls of spikelets $\frac{1}{6}$–$\frac{1}{4}$ in. diam., soft, encircling the rhachis; spikelets broader than long, $\frac{1}{8}$–$\frac{1}{6}$ in. across the awns.

Warmer parts of the Island; common, especially in paddy fields. Infl. pale green or white.
Trop. Asia, Africa, and Australia.

### 66. MYRIOSTACHYA, *Hook. f.*

A tall, very stout, perennial, glabrous, marsh grass; rootstock thick, spongy, giving off vermiform roots clothed with branching capillary root-fibres; stem erect, simple or sparingly branched; l. chiefly radical, very long, linear, flat, coriaceous, smooth, basal sheaths compressed, equitant; spikelets innumerable, strongly laterally compressed, 6–20-fld., distichously racemed on the short, crowded, filiform branches of a long, narrow, erect, thyrsiform panicle with a stout rhachis, shortly pedicelled, not articulate on the pedicels which are articulate on the branches, rhachilla very stout, shortly produced between the flg. glumes but not beyond the uppermost (neuter) glume; glumes all coriaceous and persistent, I and II empty, subequal, 1-veined, lanceolate, tapering into rigid awns, flg. glumes quite glabrous, ovate-lanceolate, 3-veined, narrowed into a short, very stout, scabrid awn, keel smooth, callus very short, palea chartaceous, as long as the glume, acuminate, 2-toothed, keels ciliate; lodicules very minute, truncate; stam. 3, anth. linear-oblong; ov. globose, styles short, distant at the base, stigmas long, penicillate, laterally exserted; grain obliquely ovoid, subterete, embryo large.—Monotypic.

**M. Wightiana,** *Hook. f. in Fl. B. Ind.* vii. 327 (1896).
*Eragrostis Wightiana*, Benth. in Hook. Ic. Pl. xiv. 62. Trim. in Journ. Bot. 1889, 171.
Fl. B. Ind. l. c. Benth. l. c. t. 1381.

Rootstock short, densely covered with roots; stem with the l.-sheaths as thick as the thumb at the base, and as a

swan's quill without the sheath, internodes long, shining, slightly compressed, nearly solid; l. 4–6 ft. by $\frac{1}{2}$–$\frac{2}{3}$ in., lower third narrowed into a complicate petiole, upper flat, glaucous beneath, narrowed into a filiform tip, midrib stout below, evanescent above the middle, margins faintly scaberulous towards the tip, sheaths very long, compressed, polished, mouth not auricled, ligule 0; panicle 1–2 ft. by 1$\frac{1}{2}$–2$\frac{1}{2}$ in. broad, rhachis quite smooth, branches 1–1$\frac{1}{2}$ in. long in approximate fascicles or whorls, filiform, bearing spikelets to the base; spikelets up to $\frac{1}{2}$ in. long, 8–20-fld., ovate or oblong, shining, pedicels scabrid, base acute at the insertion, rhachilla glabrous; limb of glumes I and II shorter than their awns, flg. glumes about $\frac{1}{6}$ in., many neuter or with imperfect fl., lateral veins slender, median very stout.

Kottiar, near Trincomalie, in brackish water (Trimen). Spikes golden brown.

Sunderbunds of Bengal, Tenasserim, Penang.

The spikelets are longer and with more numerous flowers in the Penang and Ceylon specimens than in the Bengal, and are hence referable to var. *longispicula*, H. f. Fl. B. Ind. vii. 328.

### 67. **ERAGROSTIS,** *Host.*

Annual or perennial, usually slender, glabrous grasses; stem erect or ascending; l. narrow; spikelets many-fld. in open or contracted panicles, rarely spicate on a simple terminal rhachis, not articulate at the base, strongly laterally compressed, ovate oblong or linear, rhachilla produced and articulate or not between the glumes, but not beyond the terminal one; glumes many, closely distichously imbricate, thin, dorsally rounded or keeled, awn 0, I and II much shorter than the spikelet, empty, I rarely 3-veined, separately deciduous, flg. glumes 3-veined, lateral veins not reaching the mid-vein, callus 0, palea deciduous with the glume or persistent on the rachilla, keels smooth, scabrid or ciliate; lodicules 2, very minute or 0; stam. 1–3, anth. short or long; styles free, stigmas penicillate, laterally exserted; grain very minute, free in the glume and palea.—Sp. about 100; 31 in *Fl. B. Ind.*

The Indian species of *Eragrostis* were worked up by Dr. Stapf for the Flora of British India. The synonymy of most of them is extremely intricate, and very difficult, often impossible, to determine satisfactorily. In revising the Ceylon species with the Peradeniya Herbarium, I have adopted a few rectifications in the nomenclature adopted in that Flora, as pointed out to me by Dr. Stapf, who has been so good as to revise

the descriptions and synonyms of *E. gangetica* (*elegantula*, Fl. B. Ind.), *E. stenophylla*, and *E. elongata*. Also he has re-examined the forms or species of the spicate group (*Plagiostachya*), of which the specimens are so mixed in the Peradeniya and Kew Herbaria, that until more materials are procured they cannot be satisfactorily distinguished and described.

Spikelets panicled.
  Rhachilla of spikelets articulate, breaking up from above downwards (*Cataclastos*).
    Grain ovoid, stam. 3 . . . . . 1. E. TENELLA.
    Grain obovoid, stam. 2 . . . . . 2. E. INTERRUPTA.
  Rhachilla of spikelets inarticulate, glumes falling away from below upwards (*Pterossa*).
    Glume II 1-veined.
      Spikelets ovate, $\frac{1}{5}$–$\frac{1}{4}$ in. broad . . 3. E. AMABILIS.
      Spikelets linear or linear-oblong, $\frac{1}{10}$–$\frac{1}{7}$ in. broad.
        Ligule very minutely ciliate.
          Spikelets mostly shortly pedicelled.
            L. glaucous, spikelets $\frac{1}{6}$–$\frac{1}{3}$ in., grain oblong . . . 4. E. GANGETICA.
            L. not glaucous, grain globose or subglobose.
              Spikelets $\frac{1}{10}$–$\frac{1}{4}$ in. . . . 5. E. STENOPHYLLA.
              Spikelets $\frac{1}{4}$–$\frac{2}{3}$ in. . . . 6. E. ELONGATA.
          Spikelets long-pedicelled.
            Spikelets $\frac{1}{10}$ in. broad . . 7. E. NIGRA.
            Spikelets $\frac{1}{30}$–$\frac{1}{20}$ in. broad . . 8. E. PILOSA.
        Ligule ciliate with long hairs . . 9. E. WILLDENOVIANA.
    Glume II 3-veined . . . . . . 10. E. MAJOR.
Spikelets distichously spicate on a long terminal rhachis (*Plagiostachya*).
  Spikelets rather turgid, pale, l. setaceous . 11. E. COROMANDELIANA.
  Spikelets strongly compressed.
    L. short, rigid, spikelets olive-green . 12. E. SECUNDA.
    L. long, spikelets straw-col'd. . . . 13. E. WALKERI.

1. **E. tenella,** *Roem. and Sch. Syst.* ii. 576 (1817), *excl. var. β.*
Herm. Mus. 25. Burm. Thes. 105. Fl. Zeyl. n. 46. *Poa tenella*, Linn. Sp. Pl. 69. *P. amabilis*, Linn. Syst. Pl. p. 68.
Fl. B. Ind. vii. 315. Kunth, Revis. Gram. ii. t. 107. Burm. Thes. Zeyl. 110, t. 47, f. 3.

A very slender annual, with matted root-fibres, and geniculately ascending stems 6–18 in. high, internodes and nodes sometimes glandular and especially of the panicle; l. 1–3 in., spreading, narrowly linear-lanceolate, rarely $\frac{1}{6}$ in. broad, glabrous or margins scaberulous, sheaths glabrous, mouth bearded with long spreading hairs, ligule a ciliate ridge; panicle effuse or contracted and sometimes interrupted, branches short or long, erect or spreading, axils penicillate with white hairs or naked, lower whorled; spikelets $\frac{1}{20}$–$\frac{1}{6}$ long by $\frac{1}{24}$ in. broad or less, not strongly compressed, 3–16-fld.,

rhachilla articulate, glabrous, disarticulating from above downwards; glumes about $\frac{1}{30}$ in. long, orbicular-ovate, very obtuse, membranous, deciduous, mid-vein percurrent (not excurrent), lateral veins marginal, $\frac{1}{2}$–$\frac{2}{3}$ as long as the glume, keels of palea more or less pectinately ciliate, cilia longer or shorter than the palea is broad; stam. 3, anth. minute; grain ovoid, $\frac{1}{60}$ in. long.

A very variable plant. The following forms are more or less distinguishable amongst the specimens in Herb. Peraden.

Var. 1, **tenella proper.**

Very slender, eglandular, panicle narrow, branches suberect; spikelets few-fld., long-pedicelled, erect, very minute, $\frac{1}{16}$–$\frac{1}{12}$ in. long; palea shortly and irregularly ciliate.—C. P. 926 (in part). Exactly resembles Burmann's, Fl. Zeyl. t. 47, f. 3, which is Linnæus's authority for *Poa amabilis.* C. P. 70.

Var. 2, **plumosa,** *Stapf in Fl. B. Ind.* vii. 315.

Stem tall and panicle eglandular, panicle 6–8 in., open, branches capillary, spreading, flexuous, lower up to 3 in.; spikelets 3–9-fld., pedicels long or short; glumes epunctulate, palea pectinately ciliate with long hairs.—*E. plumosa,* Link, Enum. Hort. Berol. i. 192. Thw. Enum. 373. Duthie, Fodd. Grass. N. Ind. 64, tt. 38, 77. *Poa plumosa,* Retz. Obs. iv. 20. Roxb. Fl. Ind. i. 337. C. P. 926 (in part).

Var. 3, **contracta,** *Hk. fil.*

Panicle narrower, ovate-oblong, 3–5 by 1–1½ in., rhachis stouter, axils of branches naked; spikelets longer, more crowded, shortly pedicelled; flg. glumes punctulate. C. P. 926 (in part).

Var. 4, **riparia,** *Stapf,* l. c.

Stem and panicle eglandular, panicle short, 1–3 by $\frac{1}{6}$–$\frac{1}{3}$ in., very narrow, subcylindric, branches very short, erect, smooth, axils glabrous; spikelets crowded; empty glumes very unequal, I one-third shorter than II, flg. glumes epunctulate.—*E. riparia,* Willd.; Steud. Syn. Gram. 265. *E. plumosa,* var. *maritima,* Trim. Cat. Ceyl. Pl. 109. C. P. 927, 928.

Var. 5, **viscosa,** *Stapf,* l. c.

Stem above and rhachis of panicle more or less viscid at the nodes, panicle ovoid-oblong, 2–3 by ½–1 in., branches spreading, axils glabrous; spikelets shortly pedicelled, 5–12-fld.; glumes epunctulate.—*E. viscosa,* Trin. in Mem. Acad. Petersb. Ser. VI. i. 397 (1831). *Poa viscosa,* Retz.; Roxb. Fl. Ind. i. 336.

Var. 6, **densiflora,** *Hook. f.*

Perennial (?); stem above and rhachis of panicle more or less viscid at the nodes, panicle ½–3 in., oblong, branches very short, covered with imbricating 10–16-fld. spikelets; glumes epunctulate, lateral veins distant from the margin, keels of palea shortly ciliate.

Common throughout the Island, especially vars. 1 and 2. Var. 3, Rama-peram (Gardner); Manaar district (Trimen). Var. 4, Caltura (Macrae), Jaffna district (Trimen). Var. 5, Mantai, Jaffna, growing with *Sporobolus orientalis.*

A widely spread species in Tropical Asia. Var. 3 from the Panjab to Malacca. Var. 4, Lower Bengal and southward. Var. 5, Gangetic Plain and southward, Burma.

Trop. and S. Africa.

The synonymy of this plant is very complicated. I have adopted Dr. Stapf's determination of the name it should bear, arrived at after a searching investigation of the descriptions of the older authors. The type of the Linnæan *Poa tenella* is in Plukenet's Herbarium (Almagest, 176, t. 300, f. 2), of which Dr. Stapf and I have examined the specimens in the British Museum. It is not the commonest Ceylon form. The full synonymy of the species (with upwards of 20 names) is given in the Flora of British India.

2. **E. interrupta,** *Beauv. Agrost.* 71 (1812).
*E. nutans*, Nees ex Steud. Syn. Gram.; Thw. Enum. 373.
Fl. B. Ind. iii. 316. Kunth, Revis. Gram. ii. t. 188 (*Poa*).

Perennial; stems tall, up to 3 ft. high, stout, as thick as a small goose-quill, or slender; l. up to 10 by $\frac{1}{3}$ in. in tall specimens, very narrow in shorter, flat, sheaths coriaceous, not auricled, ligule a fringe of short hairs; panicle very various, up to 12 in. long, branches few or many, alt. or subwhorled, suberect, long or short, rhachis smooth or scaberulous; spikelets minute, erect, $\frac{1}{20}$–$\frac{1}{10}$ in., 3–13-fld., green or colourless, rachilla articulate between the flg. glumes, glabrous, disarticulating from above downward; glumes hyaline, keels smooth, I and II subequal, ovate-oblong, obtuse, 1-veined, flg. glume $\frac{1}{32}$–$\frac{1}{28}$ in., ovate-oblong, obtuse or tip rounded, mid-vein very slender, lateral submarginal, palea linear-oblong, keels smooth or minutely scaberulous; stam. 2, anth. small, linear-oblong; grain very minute, obovoid, yellow- or red-brown, shining.

Var. **diplachnoides,** *Stapf in Fl. B. Ind.* iii. 316.

Stem tall, stout, branched; panicle effuse or contracted, branches solitary, opposite or 3-nate, 2–5 in. long, ultimate not divaricate; spikelets 6–12-fld.; flg. glumes rarely $\frac{1}{32}$ in. *E. diplachnoides*, Steud. Syn. Gram. 268. C. P. 3259, 933 (in part).

Var. **Kœnigii,** *Stapf*, l. c.

Stem tall, stout or slender; panicle long, narrow, with short dense pseudo-whorls; spikelets shortly pedicelled, 6- or more-fld. *E. Kœnigii*, Link, Hort. Berol. ii. 294 in syn.

Var. **tenuissima,** *Stapf*, l. c. *E. tenuissima*, Schrad. ex Nees, Fl. Afr. Aust. 409, 410.

Stem 3–8 in., very slender; l. almost filiform, convolute; panicle strict, erect, of 6–10 very dense fascicles of branches $\frac{1}{2}$–1 in. long placed at the subequal intervals on a slender rhachis; spikelets densely crowded, about 6-fld., glume I veinless.

Hot drier parts of the Island; common. Var. *Kœnigii*, N. Pullam. Var. *diplachnoides* Tissa-maha-rama Tank, Abukala Korale, Konegalla, near Mootilinsa (?) (Gardner). Var. *tenuissima*, Punakari, Jaffna district (Trimen).

Trop. and subtrop. Asia and Africa.

The three varieties described above pass directly into one

another, and, though more or less distinguishable in a large assortment of Indian specimens, are hardly so in Ceylon. Var. *tenuissima* looks very distinct, but intermediates occur in Continental India and elsewhere. 'A tall grass, 3–5 ft. high, with beautiful feathery drooping panicles and purple flowers, growing in large quantities in a clayey soil' (Ferguson).

3. **E. amabilis,** *Wight and Arn. ex Hook. and Arn. Bot. Beech. Voy.* 251, *excl. syn.* (non Linn.).

*E. unioloides*, Nees; Thw. Enum. 373. *Poa amabilis*, Moon, Cat. 8 (non Linn.). C. P. 930.

Fl. B. Ind. iii. 317. Lamk. Illustr. i. t. 45. f. 2 (*Poa rubens*).

Annual, glabrous; stem 6–18 in., tufted, slender, erect or geniculately ascending, leafy chiefly at the base, internodes long; l. 3–6 by $\frac{1}{10}$–$\frac{1}{6}$ in., narrowed from the broad subcordate base to the acute tip, quite smooth, rather flaccid, margins smooth, veins obscure, sheaths smooth, mouth narrower than the blade, not auricled, glabrous or sparsely hairy, ligule 0 or of minute hairs; panicle oblong or ovoid, 2–4 in. long, rather sparingly branched, rhachis and filiform branches quite smooth; spikelets $\frac{1}{5}$–$\frac{1}{4}$ in., very shortly pedicelled, ovate to ovate-oblong, strongly compressed, 20–50-fld., green or red-purple, rhachilla tough, internodes very short, nodes bearing the torn bases of the paleas; empty glumes broadly ovate, cuspidately acuminate, 1-veined, flg. glumes about $\frac{1}{12}$ in., orbicular-ovate, keels and tips dorsally scaberulous, strongly punctulate as if scaberulous, lateral veins equidistant from the margins and median, produced far up towards the latter, palea broad, rather shorter than the glume and deciduous with it, keels scabridly ciliate; stam. 3, anth. minute, yellow; grain shortly oblong obovoid or oval, laterally compressed, about $\frac{1}{30}$ in. long, orange-brown, smooth.

Abundant throughout the warmer regions of the Island.

Trop. and subtrop. Asia.

Ferguson describes this as having two kinds of panicles: one narrow, compact; the other large, open, spreading, with beautiful flowers of a whitish-purple tinge, but sometimes white.

4. **E. gangetica,** *Steud. Syn. Gram.* 266 (1854). **Ela-kooru-tana,** *S.*

*E. Brownii*, Nees; Thw. Enum. 373. *E. elegantula*, Stapf in Fl. B. Ind. vii. 318 (non Nees). *E. orientalis*, Thw. l. c. partim. *Poa glaucoides*, Moon, Cat. 9. *Poa gangetica*, Roxb. Fl. Ind. i. 340. C. P. 925 partim, 931.

Fl. B. Ind. l. c. (*elegantula*).

Perennial; stems 2–4 ft., stout, smooth, shining, densely tufted, simple or branched, erect from a mass of stout root-fibres, base in large specimens clothed with shining membranous old l.-sheaths; l. 6–10 in., very narrow, almost filiform, convolute, rigid, quite smooth, glaucous, glabrous, base

narrowed, sheaths coriaceous, smooth, mouth hardly auricled, glabrous or bearded, ligule a ridge of very minute hairs; panicle 3–6 in., inclined, ovate or oblong, rhachis slender, quite smooth, branches long, solitary, suberect, filiform, flexuous, scaberulous, naked below; spikelets alt. but rather crowded, mostly shortly pedicelled, $\frac{1}{6}$–$\frac{1}{3}$ by $\frac{1}{15}$–$\frac{1}{10}$ in., ovate-oblong, grey-green, 30–40-fld., rachilla stout, tough, glabrous, internodes very short; glumes closely punctulate, I and II ovate-oblong, subacute, 1-veined, II one-third longer than I, flg. glumes broadly ovate or orbicular-ovate, subacute, palea obovate-oblong, truncate, deciduous, keels scaberulous; stam. 3, anth. almost half as long as the palea, yellow; grain oblong, about $\frac{1}{30}$ in. long, striolate, yellow-brown.

Very abundant throughout the Island; on dry sand, also in water (Ferguson).

Throughout India, S. Africa.

The above description is taken from the Herb. Peraden. specimens of Thwaites, C. P. 931 (*E. Brownii*), with which Gardner's specimens cited in Fl. B. Ind. (*E. elegantula*) agree. In that work, C. P. 931 is referred to *E. elongata*, and *E. zeylanica* to *E. elegans*. These three species, *E. gangetica*, *stenophylla*, and *elegantula*, are very closely allied, some specimens of each are with difficulty distinguished in the dried state, and their synonymy is almost hopelessly entangled. The name *elegantula* was proposed by Kunth for Roxburgh's *Poa elegans*, which that author describes as a very elegant delicate grass, with 8–12-fld. purplish spikelets, and globular grains. These characters are foreign to the plant here described, which is a tall, stiff, wiry grass, easily recognised, according to Ferguson, by its glaucous metallic hue.

5. **E. stenophylla,** *Hochst. ex Miq. Analect. Bot. Ind.* ii. 27 (1851). *E. orientalis*, Nees; Thw. Enum. 373 (partim). C. P. 925 (partim), 932. Fl. B. Ind. vii. 318. Duthie, Fodd. Grass. N. Ind. t. 74 (*E. elegantula*).

Perennial; stems densely tufted, 12–18 in., slender or rather stout, erect or geniculately ascending, simple or branched, upper internodes very long; l. 3–5 in., very narrow, strict, rather stiff, complicate or convolute, rarely flat, smooth, quite glabrous, not glaucous, sheaths smooth, auricles glabrous or bearded, ligule of most minute hairs; panicle suberect or nodding, 3–8 in. long, effuse or contracted, rhachis very slender, smooth, branches long, subsolitary, rather distant, capillary, smooth, naked below, much divided upwards, axils glabrous, eglandular; spikelets $\frac{1}{10}$–$\frac{1}{4}$ by $\frac{1}{20}$–$\frac{1}{15}$ in., ovate to linear-oblong, 10–30-fld., pale olive-green, longer or shorter than their capillary pedicels, rhachilla slender, tough, flexuous; glumes membranous, punctulate, I and II ovate, subacute, 1-veined, II one half longer than I, flg. glumes broadly ovate, subacute, keels smooth, palea linear-oblong, caducous with the glumes, keels ciliolate; stam. 3, anth. about one-third the

length of the glume, orange-yellow; grain globose $\frac{1}{50}$–$\frac{1}{40}$ in. diam., smooth, not striolate, hilum large.

Central Province; not uncommon (Thwaites). Jaffna (Gardner, Trimen). Common in dry sandy soils in cinnamon gardens (Ferguson).
Trop. Asia and Africa.

6. **E. elongata,** *Jacq. Eclog. Gram.* 3, t. 3. **Mal-aetora-tana,** *S.*
*E. zeylanica*, Nees and Mey. in Nov. Act. Nat. Cur. xix. Suppl. i. 205; Thw. Enum. 373. C. P. 3251.
Fl. B. Ind. vii. 319.

Perennial (?); stem 1–2 ft., slender, erect or ascending, leafy chiefly at the base, upper internodes very long; l. short, 2–3 in., very narrowly linear, erect, rather rigid, smooth, not glaucous, upper surface towards the base hirsute, sheaths smooth, auricles glabrous or bearded, ligule a ridge of most minute hairs; panicle erect, 2–7 in. long, broadly ovate, very lax, rhachis slender, smooth, strict, branches few, very short, 1 in. long, solitary, distant, filiform, strict, horizontally spreading, rarely again branched, bearing from or near the base upwards 6–10 or more subsessile usually crowded spikelets, lower branches often far down the rhachis; spikelets $\frac{1}{4}$–$\frac{2}{3}$ by $\frac{1}{7}$ in., all pointing forwards, very shortly pedicelled, linear, pale or reddish, very many-fld., rhachilla stout, rigid, smooth; glumes 20–30, coriaceous with hyaline margins, epunctate, I and II unequal, ovate, acuminate, strongly 1-veined, flg. glumes broadly ovate, acuminate, laterally much compressed, keel nearly straight, palea linear-oblong, obtuse, persistent, keels stout, scabrid; stam. 3, anth. about $\frac{1}{6}$ in. the length of the glume, dark orange-yellow; grain globose or globosely oblong, $\frac{1}{50}$–$\frac{1}{40}$ in. diam., rather rough, orange-brown.

Hotter parts of the Island. Ratnapura (Thwaites), Opatte (Trimen).
S. Europ., Trop. As., Afr., Australia, Pacific Islds.
In the Peradeniya Herbarium, C. P. 3251 is the only number given to this; the other C. P. number given in Fl. B. Ind. (under *elongata*), 931, is *E. Brownii* of Herb. Perad. (*gangetica*). As to C. P. 3047, in Thwaites's Index of C. P. numbers (Enum. p. 464), pp. 352 and 434 are referred to for it, but on both these pages *Eleocharis fistulosa* bears that number. The hirsute base of the leaves on the upper surface distinguishes this from the very closely allied *E. stenophylla*.

7. **E. nigra,** *Nees ex Steud. Syn. Gram.* 267 (1854).
*E. paniculata*, Thw. Enum. 373 (non Steud.). C. P. 2626.
Fl. B. Ind. vii. 324.

Perennial; stem up to 3 ft., rather stout or slender, leafy; l. up to 7 by $\frac{1}{4}$ in., flat, flaccid, finely almost aristately acuminate, faintly scaberulous above, beneath and margins smooth, base narrowed, sheaths smooth, auricles bearded with long hairs, ligule a ridge of very short hairs; panicle up to 8 in. long, effuse, rhachis slender and branches smooth, upper

nodes sparingly bearded, branches spreading, capillary, alt. or whorled, lower sometimes 6 in. long, sparingly divided from near the base; spikelets scattered (never fascicled), $\frac{1}{8}$–$\frac{1}{5}$ by $\frac{1}{10}$ in., 3–9-fld., ovate, much shorter than their pedicels, pale olive-grey, rhachilla tough, scaberulous; glumes I and II subequal or II longest, ovate-lanceolate, subaristately acuminate, 1-veined, keels scaberulous, flg. glumes orbicular, cupular, apiculate, lateral veins long, keels and palea scabrid; stam. 3, anth. minute; grain short, turgid, subquadrate, truncately rounded at both ends, minutely stipitate, dorsally depressed, dark brown, rugulose.

Central Provinces. Dambulla and Maturatte districts.

All India.

A very variable grass, of which I have described above only the Ceylon form. In small Indian specimens the l. are chiefly basal, with short sheaths.

8. **E. pilosa,** *Beauv. Agrost.* 71 (1812).

Thw. Enum. 209. C. P. 929.

Fl. B. Ind. vii. 323. Host, Gram. Austriac. t. 68 (*Poa*). Reichb. Ic. Fl. Germ. t. 91, fig. 1659 and fig. 1660 (*E. verticillata*, R. and S.).

Annual; stems 6–24 in., densely tufted, very slender, flaccid, erect or geniculately ascending; l. short, very narrow, usually convolute, filiform, flexuous, quite smooth, sheaths appressed, glabrous, mouth with short long-bearded auricles, ligule a ridge of very short hairs; panicle 2–6 in. long, erect or inclined, effuse or contracted, rhachis filiform and branches smooth, branches alt. fascicled or whorled, all capillary, much divided, nodes sparsely furnished with very long hairs; spikelets scattered (never fascicled), $\frac{1}{10}$–$\frac{1}{5}$ by $\frac{1}{30}$–$\frac{1}{20}$ in., 5–10-fld., erect, ovate- to linear-lanceolate, usually purplish, pedicels rarely shorter than the spikelets, rhachilla tough, smooth, flexuous; glumes all hyaline, I and II very unequal, I ovate, veinless, II much larger, ovate-lanceolate, acuminate, strongly 1-veined, keels smooth, flg. glumes much longer than the empty, ovate, acute, palea subpersistent, keels smooth or nearly so; stam. 3, anth. minute, violet; grain about $\frac{1}{15}$ in., ellipsoid or obovoid, embryo narrow.

Common in the warmer parts of the Island, ascending to 6000 ft. Generally occurring in large patches (Ferguson).

S. Europe and most warm countries.

The Ceylon specimens have fewer glumes than occur in many Indian and other forms. A dwarf state is common in the paths of the Peradeniya Gardens.

9. **E. Willdenoviana,** *Nees in Wight, Cat. n.* 1779 (*non in Nov. Act.*).

*E. poaeoides*, Trim. Cat. Ceyl. Pl. 109 (non Beauv.). C. P. 3944.

Fl. B. Ind. vii. 322.

Annual (?), densely tufted; stems 4–18 in., slender, geniculately ascending, leafy at the base chiefly; l. 2–3 in., erect, very narrow, $\frac{1}{16}$–$\frac{1}{12}$ in., smooth, margins involute, sometimes glandular, sheaths smooth or margins ciliate, auricles naked or bearded with long, soft, white hairs, ligule a ridge of short hairs; panicle erect, 2–4 in., ovate, open, rhachis slender, smooth, branches few, solitary, distant, spreading, capillary, axils glabrous, eglandular, branchlets spreading; spikelets longer than their pedicels, linear, $\frac{1}{8}$–$\frac{1}{4}$ by $\frac{1}{20}$ in., 10–20-fld., olive-grey or yellowish, rhachilla firm, flexuous, smooth; glumes hyaline, keels smooth, I and II very unequal, ovate, obtuse, I veinless, II 1-veined, flg. glumes broadly ovate, obtuse, epunctate, lateral veins near the margins, palea linear-oblong, persistent, keels minutely scaberulous; stam. I, anth. very minute, yellow; grain about $\frac{1}{60}$ in. long, subquadrate or subglobose, truncately rounded at both ends, laterally compressed, red-brown.

Trincomalie (Glenie); Punakari, Jaffna district (Trimen).
Also in Mysore.

10. **E. major,** *Host, Gram. Austriac.* iv. 14 (1809).
*E. megastachya*, Link, Hort. Berol. i. 187; Thw. Enum. 373. C. P. 3163.
Fl. B. Ind. vii. 320. Host, l. c. t. 24. Reichb. Ic. Fl. Germ. t. 91.

Annual; stems 1–3 ft., usually stout and branched, leafy, erect or geniculately ascending, smooth, polished; l. up to 8 by $\frac{1}{3}$ in., narrowed into filiform tips, flaccid, smooth, margins obscurely scaberulous, base rounded, veins many, sheaths smooth, auricles villously bearded, ligule of rather long hairs; panicle up to 8 in., erect, oblong or ovate-oblong, rhachis strict, rather stout, smooth, branches numerous, fascicled and whorled, spreading or suberect, again branching from the base, branchlets short, capillary; spikelets longer than their pedicels, usually crowded, ovate and $\frac{1}{6}$–$\frac{1}{4}$ in. long, with 6–8 glumes, to linear-oblong, rather narrowed upwards and $\frac{1}{3}$–$\frac{1}{2}$ in. long, with many up to 60 glumes, olive-grey or yellowish, rhachilla tough, zigzag, internodes short, smooth; empty glumes unequal, aristately acuminate, I ovate, 1-veined, II much larger, orbicular-ovate, 3-veined, lateral veins short, flg. glumes orbicular, obtuse, cupular, punctulate, lateral veins long, arched, palea broadly oval, keels ciliate; anth. 3, very minute; grain globose, minutely rugulose, about $\frac{1}{40}$ in. diam., red-brown.

Hot drier parts of the Island; common.
S. Europe, Trop. and Subtrop. Asia.
A very variable grass in India, both in panicle and foliage. The

leaves have sometimes glandular margins, and the axils of the branches of the panicle are often more or less bearded and glandular.

11. **E. coromandeliana,** *Trin. in Mem. Acad. Petersb.* VI. i. 415 (1831).
*Poa coromandeliana,* Kœn. ex Rottb.; Roth, Nov. Pl .Sp. 71. C. P. 60 (partim).
Fl. B. Ind. vii. 326 (partim).

Perennial, densely tufted; stems 12–30 in., slender or rather stout; l. 1–6 in., filiform or setaceous, convolute, spreading and recurved, smooth, puberulous above, glaucous, sheaths short, mouth glabrous, auricles 0, ligule a narrow ridge; spike 4–8 in., sometimes interrupted, rhachis slender, terete, smooth; spikelets close-set, erecto-patent, $\frac{1}{6}$–$\frac{1}{2}$ by $\frac{1}{12}$–$\frac{1}{10}$ in., 10–30-fld., oblong to linear-oblong, very pale olive-grey or whitish; glumes rather turgid, I and II subequal, I acutely keeled, II obtusely keeled, flg. glumes very broadly ovate, up to $\frac{1}{12}$ in. long, acute or subacute, veins faint, keels smooth or faintly scabrid, palea almost as long as the glume, keels very narrowly winged, scabrid; stam. 3, anth. $\frac{1}{32}$ in.; grain $\frac{1}{50}$–$\frac{1}{30}$ in., shortly ellipsoid, obtusely trigonous, epicarp loosely reticulate.

Central Province, Dambulla (Thwaites), Rata patana, and Kandan Korale (Nevill).
Behar, Rajpootana, and southward to Burma.

12. **E. secunda,** *Nees ex Steud. Syn. Gram.* 264 (1854).
*E. bifaria,* Thw. Enum. 373 (excl. syn.) (partim). C. P. 60 (partim).
Fl. B. Ind. vii. 326 (partim).

Perennial; stems 12–20 in., densely tufted; l. 6–7 in., more or less rigid, convolute, filiform, wiry, glabrous, smooth, sheaths short, glabrous, auricles small, ciliate with long flexuous hairs; spike 3–5 in., rhachis terete, smooth, glabrous; spikelets $\frac{1}{6}$–$\frac{1}{3}$ in. long, turgid but compressed, ovate, 10–12-fld., dusky olive-green, not shining; glumes I and II obscurely 3-veined, I ovate-oblong, obtuse, II broadly ovate, subacute, flg. glumes turgid, rather coriaceous, orbicular-ovate, acute, palea as long as the glume, narrowly winged, wing scaberulous; grain oblong-ovoid, striate.

Montane zone, ascending to 5000 ft. Galagama (Gardner), patanas of the Uva Prov. near Bandarawela (Pearson).
Endemic.

13. **E. Walkeri,** *Stapf.*
*E. bifaria,* Thw. Enum. 373 (excl. syn.) (partim). C. P. 60 (partim).

Perennial, densely tufted; stems 2–2$\frac{1}{2}$ ft., as slender as a sparrow's quill; l. 12–18 in., flat, up to $\frac{1}{8}$ in. broad, or convolute, puberulous above, veins strong, sheaths up to 4 in. long,

glabrous, auricles small, glabrous, ligule a narrow ridge; panicle 8–10 in., rhachis very slender; spikelets rather distant, $\frac{1}{6}$–$\frac{1}{4}$ in. long, ovate or shortly oblong, nearly white, 12–30-fld.; glumes very membranous, turgid, I ovate-oblong, obtuse, II broadly ovate, flg. glumes orbicular-ovate, obtuse, palea very shortly winged, wings scabrid; grain oblong, striate, and loosely reticulate.

Ceylon (Walker). Western Province, Kurunegala (Trimen). Central Province, Galagama, below Horton Plains (Thwaites).

Endemic.

This, *E. secunda* and *E. coromandeliana* are very imperfectly diagnosed, from the material in Herb. Peraden. and Herb. Kew. being insufficient. They are possibly not all distinct.

## 68. **HALOPYRUM,** *Stapf.*

A stout, rigid, perennial, glabrous grass; rootstock stout, creeping, with vermiform tomentose roots, internodes solid; l. almost filiform, convolute, finely acuminate, smooth, infl. an elongate compressed panicle, with short, alternate, spiciform branches; spikelets large, ovoid, many-fld., not articulate at the base, sessile or shortly pedicelled on the short branches of the panicle, strongly laterally compressed, rhachilla very short between the flg. glumes, articulate at the base; glumes coriaceous, I and II unequal, oblong-lanceolate, acute, empty, persistent, I 1–3-veined, II larger, 5-veined, flg. glumes 6–20, ovate-oblong, cymbiform, acute, 3-veined, dorsally rounded, callus short, silkily bearded, palea as long as the glume, chartaceous, keels scaberulous; lodicules cuneate or obcordate, truncate top irregularly toothed; stam. 3, anth. long, slender; styles short, distant at the base, stigmas not long, laterally exserted; grain oblong or ellipsoid, compressed, more or less concavo-convex, free within the glumes, embryo large.—Monotypic.

**H. mucronatum,** *Stapf in Hook. Ic. Pl.* t. 2448 (1896).

*Eragrostis mucronata*, Trim. Cat. Pl. Ceyl. 109. *Triticum repens*, Thw. Enum. 376. C. P. 924.

Fl. B. Ind. vii. 328.

Rootstock sending up hard woody stems 12–18 in. high and as thick as a crow-quill, smooth, shining, branches often fascicled and clothed at the base with pale, coriaceous, shining, mucronate sheaths; l. 8–12 in., rarely flat, glaucous, coriaceous striate, quite smooth, as are the usually involute margins, base

not contracted, much narrower than the truncate mouth of the sheath, which is not auricled, but villous with the long hairs composing the ligule; panicle 12–16 in., erect or nodding, rhachis and branches quite smooth, angular, wiry, pedicels pubescent below the spikelets or glabrous; spikelets $\frac{1}{3}$–$\frac{2}{3}$ in. long, rarely more, flat; flg. glumes articulate at the base, callus very short, hairs nearly half as long as the glumes; grain $\frac{1}{10}$ in. long, red-brown.

Northern Province, Adam's Bridge. Spikelets pale yellow.
Tinnevelly, Scind, Arabia, E. Trop. Africa.

### 69. **DIPLACHNE,** *Beauv.*

Tufted, perennial (?) grasses; stems erect or ascending, stout or slender, simple or sparingly branched; l. narrow; spikelets few- or many-fld., sessile, uniseriate on the slender spiciform branches of a contracted, subsimple, erect panicle, not articulate at the base, strongly laterally compressed, rhachilla articulate between the flg. glumes, not produced beyond the neuter uppermost; glumes I and II unequal, membranous, 1-veined, oblong, obtuse, persistent, flg. glumes thin, oval, tip bidentate with a mucro in the sinus, 3-veined, lateral veins marginal, callus very short, bearded, palea as long as the glume, keels ciliate; lodicules cuneate; stam. 3, anth. short; styles short, bases distant, stigmas short, plumose, laterally exserted; grain oblong, stipitate, concavo-convex, free in the glumes.—Sp. about 20; 1 in *Fl. B. Ind.*

**D. fusca,** *Beauv. Agrost.* 163 (1812).
Trim. Syst. Cat. Ceyl. Pl. 109. *Uralepis fusca*, Steud.; Thw. Enum. 372. C. P. 934.
Fl. B. Ind. vii. 328. Del. Fl. Ægypt. t. xi. f. 1 (*Festuca fusca*). Rheede, Hort. Mal. xii. t. 45.

Stems tufted, 1–3 ft. high, erect from the fibrous roots, up to the thickness of a goose-quill, simple or branched, sometimes proliferously, terete, polished, internodes long; l. chiefly radical, strict, erect, 6–10 by $\frac{1}{20}$–$\frac{1}{10}$ in., flat or convolute, finely acuminate, faintly scaberulous, base not constricted, sheaths long, smooth, mouth truncate, not auricled, ligule oblong, membranous, lacerate; panicle 6–10 in. long, erect, narrowly oblong, rhachis smooth, spiciform branches filiform, lower 1–4 in. long; spikelets erect, rather distant, $\frac{1}{4}$–$\frac{1}{2}$ in. long, 4–10-fld., green, rhachilla slender; glumes I and II with smooth or scaberulous keels, I oblong-lanceolate, obtuse, II about one-third longer and broader, acute or tip erose, flg. glumes oval,

tip 2-toothed, or erose and truncate or abruptly acuminate, midrib ending in a mucro, lateral veins not reaching the tip, silkily hairy to the middle, as are the keels of the palea, callus very short; grain half as long as the palea, red-brown.

Elephant Pass (Gardner), Jaffna (Trimen).

Egypt, Trop. Asia, Africa, Australia.

A dwarf, probably seedling form, 2-3 in. high, with a subsimple spike, was collected at Pallavarayankaddu, in the Jaffna district, by Dr. Trimen.

### 70. **STREPTOGYNE,** *Beauv.*

A tall, slender, erect, glabrous, perennial grass; l. linear-lanceolate, petiolate, veins minutely trabeculate; spikelets very long, narrow, subterete, 1–4-fld., erect, imbricating on an erect unilateral spike, sessile, not articulate at the base, rhachilla very long, slender, articulate at the base; glumes 8–10, chartaceous, distant, upper gradually smaller, neuter, I and II empty, persistent, I oblong, tip obliquely truncate, erose, 3–7-veined to the tip, II much longer, oblong-lanceolate, acuminate, shortly awned, tip entire or bidentate, veins many, trabeculate, lower flg. glumes very narrow, convolute, 3-veined, tip acutely bifid, awned in the sinus, callus acute, villous, palea as long as the glume, very narrow, tip membranous, keels close together, smooth; lodicules elongate, subclavate; stam. 2–3, anth. very slender; ov. linear, narrowed into a long twisted style, with 3 very long, tortuous, barbellate stigmas; grain linear, terete, free, but closely embraced by the glume and palea.—Sp. 2; 1 in *Fl. B. Ind.*

**S. gerontogæa,** *Hook. f.*

*S. crinita*, Thw. Enum. 374 (non Beauv.). C. P. 922.

Fl. B. Ind. vii. 333 (*S. crinita*).

Stem 2–3 ft., as thick as a crow-quill, smooth, internodes, except the lower, very long; l. 6–10 by $\frac{1}{2}$–$\frac{3}{4}$ in., finely acuminate, thinly coriaceous, midrib very slender, shining beneath, lateral veins few, branching off from above the base, petiole $\frac{1}{4}$–$\frac{2}{3}$ in., deeply channelled above, sheaths smooth, mouth auricled, ligule short, membranous, ciliate, produced over the auricles; spikelets green, 1–1$\frac{1}{4}$ in. long; glumes I and II glabrous, convolute, veins slender, equidistant, flg. glumes silkily villous below the middle, 1 in. long, awn about half the length of the glume, strict, neuter glumes glabrous; stigmas $\frac{1}{2}$ in. long, those of two or more spikelets twisted together, scabrid from the rather distant, spreading and recurved barbs, tips spirally revolute.

Central and Western Provinces. Matelle (Gardner), Heneratgoda (Trimen). Spikes dark green.

Travancore, W. Trop. Africa.

The Ceylon species differs from the American *S. crinita* in the much longer glume I with slender equidistant veins, and silkily villous flg. glumes.

71. **LOPHATHERUM,** *Brongn.*

Tall, erect, perennial grasses; l. broad, shortly petioled, veins trabeculate, petiole articulate on the sheath; spikelets 1-fld., biseriate, secund, sessile, articulate on the spiciform branches of a simple elongate panicle, laterally compressed, or subcylindric, rhachilla long, slender, naked, adnate to the base of the palea, bearing at the top 3–8 small crowded convolute, imperfect awned neuter glumes, the awns of which protrude at the tip of the spikelets; glumes convolute, margins and tip membranous, I and II empty, 3–5-veined, oblong-ovate, I tip rounded, II obtuse or apiculate, flg. glume larger than the empty, base articulate, broadly ovate, obtuse, shortly sub-dorsally awned below the obscurely notched tip, 5–9-veined, callus very short, naked; palea narrow, hyaline, keels nearly smooth; lodicules 2, cuneate-quadrate; stam. 2, anth. linear; styles elongate, bases diverging from the narrow neck of the ov., stigmatic hairs long, lax; grain fusiform and terete, or oblong and compressed, free in the glume, embryo long.—Sp. 3 or 4; 1 in *Fl. B. Ind.*

Glume I naked . . . . . . . . . 1. L. GRACILE.
Glume I bearded . . . . . . . . 2. L. ZEYLANICUM.

1. **L. gracile,** *Brongn. in Duperz. Voy. Bot.* 50 (1829).
Thw. Enum. 374 (in part). C. P. 921.
Fl. B. Ind. vii. 331. Brongn. l. c. t. 8.

Stem 2–5 ft., erect or shortly ascending from a branching woody rootstock, soft, smooth, as thick as a small goose-quill, internodes very long; l. distant, 6–10 by 1–1½ in., ovate-lanceolate, acuminate, membranous, base rounded or cuneate, upper sparsely minutely hairy above, glabrous beneath, margins smooth, midrib and 5–6 pairs of veins very slender, petiole $\frac{1}{6}$–$\frac{1}{4}$ in., slender, channelled above, sheaths long, membranous, glabrous or margin ciliate, mouth truncate, ligule 0; panicle 12–16 in., erect or inclined, rhachis smooth, branches very few, sub-secund, solitary or binate, lower up to 6 in. long, upper short, rhachis strict, smooth; spikelets $\frac{1}{3}$–$\frac{1}{2}$ in. long, lanceolate, rhachilla slender, about one-third shorter than flg. glume, smooth, terminated by 8–9 minute, convolute, oblong, shortly

awned neuter glumes; glumes coriaceous with narrowly membranous margins, tightly convolute, all persistent, I and II ovate-oblong, obtuse, 5-veined, II rather the longest; flg. glumes $\frac{1}{3}$ longer than II, oval, 5-veined, awn $\frac{1}{4}$ the length of the glume, rigid, callus very short, naked, palea shorter than the glume, linear, bifid, keels minutely scaberulous; grain $\frac{1}{6}$ in. long, fusiform, terete.

Common in the Western Province, ascending to 4000 ft. (Thwaites), Matelle and Hantane (Gardner). Spikelets green.

Eastern Himalaya, Khasia, Burma, Malaya, China, N. Guinea.

2. **L. zeylanicum,** *Hook. f.*

*L. gracile*, Thw. Enum. 374 (in part). C. P. 920.

Habit, &c., of *L. gracile*, but not so tall; l. 6–9 by $\frac{1}{3}$–$\frac{1}{2}$ in., linear-lanceolate, acuminate, puberulous above, margins scaberulous, base cuneate, petiole $\frac{1}{3}$–$\frac{1}{2}$ in., sheaths pubescent with spreading hairs, mouth truncate, hairy; panicle 8–10 in., spiciform branches many, short, 1–1$\frac{1}{2}$ in. long, erect, lowest longer; spikelets $\frac{1}{4}$ in. long, laterally compressed, imbricating, base shortly bearded, rhachilla as in *L. gracile*, but bearing only 2–3 neuter awned spikelets; glume I nearly orbicular, 5-veined, margins hirsutely ciliate with long hairs, II nearly twice as long, broadly ovate, obtuse, 7-veined, glabrous, flg. glume as in *L. gracile* but 9-veined.

Ceylon (Walker). Woods of the S. of the Island (Thwaites), Pasdun Korale (Gardner). Spikelets green.

Endemic.

A very different species from, though in many respects closely resembling, *L. gracile*. It is readily distinguishable by its smaller size, narrow leaves, hairy sheaths, short spikes, crowded spikelets bearded at the base, short bearded glume I, and few neuter glumes.

## 72. CENTOTHECA, *Desv.*

Tall, leafy, perennial grasses; l. broadly oblong or lanceolate, veins trabeculate; spikelets 1–3-fld., alt. and secund on the long spiciform capillary branches of a lax subsimple panicle, not articulate at the base, laterally compressed, all perfect or one or more upper neuter, rhachilla slender, articulate at the base and between the flg. glumes, not produced beyond the uppermost; glumes I and II distant at their insertions, ovate-oblong, empty, persistent, 3-veined, II largest, flg. glumes broadly ovate, obtuse, apiculate, dorsally rounded, 7-veined, naked or the upper usually bearing above the middle soft, erect, at length deflexed tubercle-based spines, palea narrow, keels ciliolate; lodicules

o; stam. 2–3, anth. linear; styles short, free, stigmas narrow, hairs short; grain ovoid, acute, terete, free within the glumes.—Sp. 3; 1 in *Fl. B. Ind.*

**C. lappacea,** *Desv. in Nouv. Bull. Soc. Philom.* ii. 189 (1810).
Thw. Enum. 374. Kunth, Revis. Gram. i. 317. *Poa malabarica,* Linn. Sp. Pl. 69. C. P. 923.

Fl. B. Ind. vii. 332. Kunth, l. c. t. 70. Beauv. Agrost. t. 14, f. 7. Trin. Sp. Gram. Ic. t. 298 (*Uniola*).

Stem 1–3 ft., erect from a woody rootstock with very stout root-fibres; l. 4–10 by 1–1¼ in., acute or acuminate, more or less unequal-sided, thin, smooth, glabrous or sparsely hairy, 9–11-veined, base narrowed but hardly into a petiole, sheaths glabrous or hairy, mouth obscurely auricled, ligule broad, membranous, erose or lacerate; panicle 8–10 in. long and broad, rhachis slender, strict, smooth, spiciform branches, suberect, lower up to 5 in. long, sometimes nearly overtopping the panicle, lower with often a short branch at the base; spikelets $\frac{1}{6}$–$\frac{1}{4}$ in. long, ovate-oblong, rhachilla scaberulous, palea sometimes decurrent on the rhachilla below the glume.

Warm region; common on margins of woods. Spikelets green.
Trop. Asia, Africa, Australia, and Pacific Islds.

In specimens growing near Colombo the spikelets are metamorphosed into leaves (Ferguson). There are no spines on the glumes of the Peraden. Herb. specimens.

### 73. ÆLUROPUS, *Trin.*

Low, much branched, very rigid, perennial, leafy grasses; l. distichous, short, strict, convolute, rarely flat, coriaceous, pungent; spikelets 6–many-fld., minute, sessile, densely crowded in terminal villous heads, laterally compressed, not articulate at the base, rhachilla obscurely jointed at the base, not produced above the upper glume, internodes very short; glumes oblong, apiculate, margins and tips broadly hyaline, I and II unequal, empty, persistent, I narrowly oblong, 1–3-veined, II much larger, 5–7-veined from below the hyaline tip, flg. glumes, oblong, apiculate, 7–9-veined, palea very large, broadly cuneate, 3-lobed, lobes erose, flaps broad, keels nearly smooth or ciliate; lodicules obliquely truncate; stam. 3, anth. minute; styles short, free, stigmas short, plumose; grain oblong or obovoid, free within the glumes.—Sp. few; 1 in *Fl. B. Ind.*

**Æ. villosus,** *Trin. ex L. Mey. Verz. Pfl. Cauc.* 18 (1831).
*Æ. lagopodioides*, Trin. ex Thw. Enum. 374. *Æ. lagopoides*, Trin. ex Trim. Cat. Ceyl. Pl. 110.

Fl. B. Ind. vii. 334. Burm. Fl. Ind. t. 12, f. 2 (*Dactylis lagopoides*). Desf. Fl. Atlant. i. t. 15 (*D. repens*).

A rigid, tufted herb; stem 3–6 in., crowded on a woody rootstock with stout root-fibres, erect, as thick as a crow-quill, simple or branched, polished, branches sometimes elongate, divaricate, 6–10 in. long, resembling stolons, giving off branchlets at the nodes, but not rooting, nodes glabrous, internodes short or long; l. $\frac{1}{6}$–1 in., narrowly lanceolate, acuminate, flat or convolute and subulate, erect or spreading, glabrous or silkily hairy, striate, base contracted, rounded, margins smooth or sparsely ciliate, sheaths short, terete or inflated, glabrous or ciliate, mouth hardly auricled, ligule an obscure hairy ridge; heads of spikelets shortly peduncled, globosely ovoid or shortly oblong, $\frac{1}{4}$–$\frac{2}{3}$ in. diam., tomentose, white; spikelets $\frac{1}{15}$–$\frac{1}{10}$ in.; glumes closely imbricate, persistent on the rhachilla, callus very short; grain $\frac{1}{40}$ in., obovate-oblong, dorsally compressed.

Sandy sea-shores, from Jaffna southwards. Spikelets pale green or white.

From the Mediterranean and Caspian regions to the Punjab, Scind, and Southern India.

*Dactylis glomerata*, Linn. (Cock's-foot grass), is said to occur at Nuwara Eliya, but, no doubt, has been introduced there. I found *Anthoxanthum odoratum*, L. (sweet-scented vernal grass), also in the place in 1879 (Ferguson).

### 74. **POA,** *L.*

Annual or perennial grasses; l. flat or convolute; spikelets 2–6-fld., in open or close panicles, laterally compressed, not articulate on their pedicels; rhachilla articulate at the base, usually terminated by one or more imperfect neuter glumes; glumes thinly herbaceous, strongly keeled, I and II empty, 1–3-veined, persistent, flg. glumes 5–7-veined, lateral veins converging towards the tip, callus very short, and rhachilla often bearded with woolly or silky hairs; lodicules 2; stam. 3, anth. short; styles short, free, stigmas plumose, laterally exserted; grain ovoid-oblong or linear, free in the glume and palea, hilum punctiform.—Sp. about 80; 17 in *Fl. B. Ind.*

**P. annua,** *Linn. Sp. Pl.* 68 (1753).
Thw. Enum. 372. C. P. 2393.
Fl. B. Ind. vii. 345. Host, Gram. Austriac. ii. t. 64.

An annual or perennial, soft, flacid, glabrous, stoloniferous grass; stems 6–12 in., tufted, or shortly creeping and rooting below, erect or ascending, leafy, slightly compressed, stolons slender; l. 2–4 by $\frac{1}{20}$–$\frac{1}{8}$ in., linear, acute or obtuse, flat, flaccid, smooth, or margins, slightly scaberulous; sheaths up to 2 in.

long, lax, longer or shorter than the blade, mouth glabrous, ligule ovate or oblong, hyaline; panicle 1–3 in. long, erect, ovate or oblong, subsecund, loosely branched, rhachis smooth, branches distant, solitary, or binate, spreading, capillary, strict, naked below, lowest often deflexed; spikelets crowded beyond the middle of the branches, $\frac{1}{8}$–$\frac{1}{6}$ in. long, sessile or shortly pedicelled, ovate or ovate-oblong, strongly compressed; glumes I and II oblong-lanceolate, acute, I 1-veined, or with occasionally 2 short lateral veins, keels minutely scaberulous, II rather longer, 3-veined, flg. glumes 3–5, broadly ovate, obtuse, prominently 5-veined, tip and margins membranous, keel and veins below silkily ciliate, keels of palea ciliate; grain oblong.

Common by roadsides in the montane zone. Nuwara Eliya, Dambulla, Balangoda, &c. Spikelets green.

Europe, Temp. Asia.

Thwaites says of this, 'possibly introduced.' I suspect it is certainly so, but Trimen does not mark it as such in his Catalogue. Ferguson describes it as so very plentiful in various parts of Dambulla, and especially on the banks of streams not near cultivation, that, though it looks very like a native plant, it may after all be an escape from packets of English seeds. It is indigenous in the Himalaya, but very doubtfully so in the Khasia and Nilgiri Hills.

## 75. **BRACHYPODIUM,** *Beauv.*

Slender, perennial grasses; stems erect, tufted on a small woody rootstock with filiform root-fibres, leafy, internodes very long; l. flat, very narrow, finely acuminate; spikelets many-fld., elongate, narrow, terete, solitary and distant on a long filiform flexuous rhachis, not articulate at the base, rhachilla articulate at the base and between the flg. glumes; glumes many, tightly imbricating (spreading in fr.), dorsally rounded, I and II small, narrow, empty, persistent, flg. glumes oblong-lanceolate, narrowed into terminal straight capillary awns, 7–9-veined, veins converging upwards, keels of palea pectinately ciliate; lodicules 2, ciliate; stam. 2–3, anth. linear; ov. bearded at the top, styles short, distant at the base, stigmas plumose, laterally exserted; grain linear-oblong, concavo-convex, adherent to the palea.—Sp. 5 or 6; 2 in *Fl. B. Ind.*

**B. sylvaticum,** *Beauv. Agrost.* 101 (1812).
Thw. Enum. 374. *B. scaberrimum*, Wight and Arn. *Triticum scaberrimum*, Steud. Nom., ed. II. ii. 717. C. P. 3253.
Fl. B. Ind. vii. 362. Host, Gram. Austriac. i. t. 21.

Stem 2–4 ft., extremely slender, inclined or drooping above, smooth, shining, internodes 2–4 in.; l. 3–6 by $\frac{1}{6}$–$\frac{1}{4}$ in.

broad at the middle, thence tapering to a very fine point and below to the narrow base, flat, flaccid, smooth or slightly scaberulous, sheaths slender, longer or shorter than the internodes, glabrous, ligule short, broad, obtuse, membranous; spike 2–6 in. long, nodding, rhachis compressed or semi-terete, smooth or subscaberulous; spikelets about $\frac{1}{4}$ in. apart, sessile or very shortly pedicelled, $\frac{1}{2}$–1 in. long, green, scaberulous, veins strong; glume I subulate, II one-third or more longer, oblong-lanceolate, acute acuminate or shortly awned, flg. glumes $\frac{1}{4}$–$\frac{1}{3}$ in. long, 7-veined, awn shorter than the glume.

Montane zone, up to 8000 ft. Elk plains, &c. Spikelets green.
Europe, N. Asia, Himalaya, Nilgiri Hills.

In Indian specimens hairy leaves occur, and sometimes pubescent, long-pedicelled spikelets.

## 76. LEPTURUS, *Br.*

Slender, glabrous grasses; l. flat or convolute, very narrow, spikelets (in the Ceylon species) 1-fld., semi-immersed in cavities of the rhachis of a simple articulate terete fragile spike, sessile, not articulate at the base, rhachilla articulate at the base, produced beyond the flg. glume, and bearing an imperfect glume; glumes 3 (and an imperfect terminal), I a very minute membranous scale concealed at the base of the cavity, II herbaceous, much longer than the flg. glumes, broad at the base with narrowly inflexed margins, narrowed above into a rigid awn longer than the internode, flg. glume concealed by glume II (which closes the cavity in the spike), chartaceous, lanceolate, 1-veined, callus minute, naked, palea chartaceous, oblong-lanceolate, keels obscure; lodicules 2, cuneiform; stam. 3, anth. linear; styles distant at the base, short, stigmas plumose, laterally exserted; grain oval-oblong, dorsally compressed, top bicuspidate, hilum small.—Sp. (?); 1 in *Fl. B. Ind.*

The relative positions of the empty glumes is at first sight deceptive, the very minute I being apparently inserted higher up than the comparatively very large II, which is continuous with the rhachis of the spike below the spikelet. The true position of I is evidenced by its margins overlapping the inflexed margins of II, and by its position, which faces the back of glume III. A study of the development of these two glumes would be interesting. *Oropetium* (p. 271) shows the same deceptive insertions of glumes I and II.

**L. repens,** *Br. Prod.* 207 (1810).
Trim. Cat. Ceyl. Pl. 110.
Fl. B. Ind. vii. 365. Duperr. Voy. Bot. t. 16.

Perennial; stem widely creeping, diffusely often proliferously branching, woody below, branches ascending, slender, leafy; l. 3–6 by $\frac{1}{8}$–$\frac{1}{4}$ in., erect or spreading, linear, acuminate, glaucous, glabrous or minutely scaberulous above, base narrowed, sheaths glabrous, auricles rounded, ligule a very narrow erose membrane; spikes 2–6 in. long, erect, strict, rhachis green, glabrous, margins of the oblong hollows membranous, internodes $\frac{1}{5}$ in. long, deeply striate, articulating surfaces flat, oblique; glume I broadly ovate, acuminate, or reduced to a narrow membrane, II twice as long as the internode of the spike, subulate from an ovate-lanceolate base, coriaceous, green, III $\frac{1}{6}$–$\frac{1}{5}$ in. long, pale, ovate-lanceolate, acuminate, margins incurved, palea nearly as long as the glume; grain pale brown.

Sea-shore, three miles south of Colombo (Ferguson). Spikelets green.

Australia, Malay and Pacific Islds.

I have not found a second flg. glume in *L. repens*, which occurs in other species. The spike resembles that of a *Rottboellia*, from which the genus differs, amongst other characters, in the spikelets not being binate.

## 77. ARUNDINARIA, *Mich.*

Erect or climbing shrubs; stems slender, nodes usually prominent, internodes rather short, branches short, fascicled; stem-sheaths papery, straw-col'd., blade small, narrow, subulate; l. usually small, articulate on the sheath, mostly net-veined; infl. variable, panicled or racemed, terminating the leafing stems, or l. and fl. branches intermixed; spikelets 1–many-fld., compressed, fl. all bisexual or the terminal imperfect; glumes I and II unequal, empty, membranous, flg. glumes longer, concave, obtuse acute mucronate or subaristate, 7–many-veined, palea 2-keeled, usually compressed; lodicules 3, ovate obovate or lanceolate, ciliate; stam. 3, exserted or not, anth. acute obtuse or tip bifid; ov. globose or oblong, smooth or hairy; grain oval or oblong, dorsally furrowed, enclosed in the glume and palea.—Sp. about 50; 28 in *Fl. B. Ind.*

Spikelets panicled.
  Panicles large, terminal, spikelets many.
    L. large, thick, margins cartilaginous . . 1. A. WALKERIANA.
    L. small, thin, margins membranous.
      Spikelets 3–5-fld., flg. glumes, obtuse . . 2. A. WIGHTIANA.
      Spikelets 5–8-fld., flg. glumes acuminate . 3. A. FLORIBUNDA.
  Panicles short, spikelets few . . . . . 4. A. DEBILIS.
Spikelets racemed . . . . . . . . 5. A. DENSIFOLIA.

1. **A. Walkeriana,** *Munro in Trans. Linn. Soc.* xxvi. 21 (1868). Beddome, Fl. Sylv. For. Man. ccxxx. Gamble, Bamb. Brit. Ind. 3. Trim. Cat. Ceyl. Pl. 110 (part). C. P. 429.
Fl. B. Ind. vii. 377. Gamble, l. c. t. 1.

Shrubby; stems tufted, thickly covered above with leafless l.-sheaths, internodes about 15 in. by 1 in. diam.; stem-sheaths papery; l. 5–11 by 1–2 in., oval or oval-oblong, or oblong-lanceolate, acuminate, base broad, rounded or cordate, glabrous, pale beneath, margins cartilaginous, serrulate with recurved spinules, midrib narrow, shining, veins 6–10 pairs, intermediates 5–6, cross-venules prominent, regular, raised beneath, petiole $\frac{1}{10}$–$\frac{1}{5}$ in., stout, l.-sheaths glabrous, striate, mouth truncate, ciliolate below the petiole, margined with long pale flexuous bristles, ligule short; infl. of fascicles of red-purple compound erect panicles 6–12 in. long, terminating leafy branches, branchlets filiform, erect, flexuous, glabrous, lower axils glandular, upper with a few long hairs; spikelets $\frac{1}{2}$–$\frac{3}{4}$ in. when young, older up to 1 in., 3–4-fld., narrow, glabrous, purple-brown, uppermost glumes usually empty, rhachilla wiry, flattened, ciliate ventrally, tip vith a ring of hairs; glumes I and II $\frac{1}{10}$–$\frac{1}{5}$ in., subequal, empty, angular, apiculate, I usually 3-veined, II 5- or more-veined, margins ciliate, flg. glumes larger, veins 2 prominent, with intermediates finer, palea about as long as the glume, acute or bifid, keels 2, ciliate; lodicules 3, obtuse, one smallest, fimbriate, veins 3, flexuous; fil. short, anth. obtuse; ov. glabrous, styles short, base swollen; grain unknown.

Central Province, montane region, alt. 5000 ft. Adam's Peak, The Knuckles, Dumbalagula, Wallakelle Hill, Mattakelle. Spikelets red-brown.
S. India, in the Pulney Hills.

Very closely allied to *A. Wightiana*, differing conspicuously in the thickened margins of the leaves. The panicles of spikes are sometimes so numerous that the infl. resembles a large brush.

On Pidurutalagala, in Aug. 1884, in profuse blossom, covering the whole upper part of the mountain, and exceeding any other Bamboo. Leaves of a very dark green for a Bamboo. (Trimen MSS.)

2. **A. Wightiana,** *Nees in Linnæa*, ix. 482 (1834).
Thw. Enum. 444. Gamble, Bamb. Brit. Ind. 4. C. P. 3860.
Fl. B. Ind. vii. 377. Rupr. Bamb. t. iii. f. 10. Bedd. Fl. Sylv., Anal. Gen. t. xxviii. Gamble, l. c. t. 2.

Rootstock short, branched; stems gregarious, 6–10 ft. or more, slender, dark green, at length yellowish-brown, nodes swollen, internodes 10–14 in., usually flattened on one side, and with a ring of fibrous hairs (from bases of fallen sheaths) below the nodes, young strongly striate, usually scabrid, branchlets whorled of l. or l. and fl. mixed, stem-sheaths 4–8 by 1–3 in., narrowed slightly upwards, straw-col'd., base

thickly clothed with stiff golden tubercle-based hairs, blade 1–1½ in. by $\frac{1}{10}$–$\frac{1}{5}$ in., subulate, flexuous, scabrid, ligule short, truncate, fimbriate; l. 1–3 by $\frac{1}{3}$–1 in., ovate or ovate-lanceolate, from a broad subsessile rounded or cordate base, acuminate, glabrous above, glaucescent beneath, midrib usually glandular-pubescent, base rounded or narrowed into a short petiole, margins not thickened, incurved, scabrid or ciliolate, midrib glabrous and shining beneath, veins 5–7-pairs, cross-venules many, regular, l.-sheaths cylindric, often purple, sometimes hispid or strigose with tubercle-based hairs, margins ciliate, mouth naked or with 5–8 deciduous bristles, ligule short, obtuse; infl. of usually densely crowded, short, leafy branches, bearing terminal loose, open panicles, 2–4 in. long and broad, of long-pedicelled spikelets, rhachis and distant spreading few-fld. branches wiry, axils glandular, pedicels filiform; spikelets ½–¾ in., narrow, 3–5-fld.; glumes distant on a very stout, compressed, scaberulous rhachilla with a ciliate top, the internodes of which are nearly half as long as the glumes; glumes glabrous, shining, I and II ovate-oblong, acute, 5–7-veined, flg. similar but longer, mucronate, many-veined and with a few cross-venules, palea as long as the glume or longer, oblong, obtuse or bicuspidate, 2-keeled and with several slender veins and cross-venules, keels ciliate; lodicules 3, unequal, obovate, fimbriate, usually obtuse, 3–7-veined, one smaller, acute; fil. short, anth. brown, tips bicuspidate; ov. glabrous, style short; grain ellipsoid, $\frac{1}{10}$–$\frac{1}{5}$ in., acute, deeply furrowed on one side.

Central Province. Pedurutalagala, alt. 8000 ft., very abundant (Thwaites). Spikelets red-brown. Fl. annually in March.

Nilgiri Hills.

I have described this plant for the suite of specimens in the Peradeniya Herbarium, which differ from the figure and description of Gamble, in the much shorter broader leaves, with cordate bases, and glabrous midrib beneath, in the sheaths not being keeled, and the perfectly glabrous glumes.

3. **A. floribunda,** *Thw. Enum.* 375 (1864).

Beddome, Fl. Sylv., For. Man. p. ccxxx. Gamble, Bamb. Brit. Ind. 5.
C. P. 2624, 4023.

Fl. B. Ind. vii. 377. Gamble, l. c. t. 3.

Shrubby; stems 2–5 ft., erect, internodes 2–4 in., tip retrorsely hirsute below the nodes; l. 5–8 by ½–¾ in., distichous, linear-lanceolate, acuminate, glabrous, base more or less narrowed into a very short 2-glandular petiole, margins scaberulous, midrib slender, veins 3–4 pairs with 5–6 intermediate, cross venules regular, conspicuous, l.-sheaths striate, sometimes hispid with long tubercle-based hairs, auricles of

mouth short, with 5–8 long twisted bristles, ligule short, often fimbriate; infl. of terminal erect panicled long-pedicelled spikelets, panicles 3–5 in. long, rhachis and branches filiform, smooth, branches erect, afterwards spreading, axils glandular; spikelets distant, about $\frac{1}{3}$ in. long, 5–8-fld., very narrow, rhachilla slender, compressed, ciliate, upper internodes half as long as the glumes, tips clavate; glumes thin, silkily puberulous, uppermost empty, I ovate-lanceolate, acuminate, tip ciliate, 3-veined, II longer, narrower, 5–9-veined, flg. glumes ovate-lanceolate, acuminate, 7–9-veined, palea as long as the glumes or longer, bicuspidate, keels 2, subciliate, veins several, very slender; lodicules 3, fimbriate, two broadly ovate, one smaller, narrower; stam. not exserted, fil. very short, anth. obtuse; ov. glabrous, style short, stigmas flattened, fimbriate; grain $\frac{1}{5}$ in. long, linear-oblong, crowned by the bifid style base, red.

Montane district, alt. 5000 ft. Spikelets pale brown.
Endemic.
Specimens collected on Adam's Peak, numbered C. P. 4023, Aug. 1869, by Dr. Thwaites, in leaf only, may belong to this species.

4. **A. debilis,** *Thw. Enum.* 375 (1864).
Bedd. Fl. Sylv., For. Man. p. ccxxx. Gamble, Bamb. Brit. Ind. 7. C. P. 1.
Fl. B. Ind. vii. 378. Gamble, l. c. t. 8.

Shrubby, apparently gregarious; stems elongated, much branched, nodes rather enlarged, internodes 2–6 by $\frac{1}{5}$–$\frac{3}{4}$ in. diam., glabrous or hispid at the top, upper smooth, yellow, shining; l. small, erect, imbricating, 1$\frac{1}{2}$–3 by $\frac{1}{5}$–$\frac{1}{3}$ in., acuminate, tip setiform, scabrid, glaucous, glabrous on both surfaces or hairy above, base acute or subtruncate, scabrous on one or both margins, midrib stout, veins 2–3 pairs, faint, with 5 intermediates, cross-venules distant or 0, petiole $\frac{1}{20}$–$\frac{1}{10}$ in., l.-sheaths glabrous, striate, tipped by a ciliate callus, auricles of mouth short, with a few long pale bristles, ligule short; infl. of short panicles of spikelets terminating slender leafy branchlets that are half whorled at the nodes of the stem, panicles racemiform, about as long as the leaves, erect or drooping, glabrous or nearly so, rhachis very slender, axils glandular, pedicels shorter than the spikelets, tips clavate; spikelets $\frac{1}{3}$–$\frac{1}{2}$ in., 3-fld., narrowly lanceolate, terete, red-brown, glabrous or puberulous, internodes of rhachilla with scabrid tips; glumes I and II ovate, mucronate, 5–7-veined, I smallest, flg. glumes similar but smaller, palea minute, bicuspidate, tip ciliate, keels smooth; lodicules 3, ovate, acute, ciliate, 3-veined; fil. short, anth. tips bifid; ov.

ovoid, glabrous, style very short, stigmatic hairs secund; grain unknown.

Montane region, alt. 6000–8000 ft. Spikelets red-brown. Flowers annually (?).

Endemic.

Mr. Gamble adds to above description, 'Characterised by the small pointed leaves, short spikelets, long glumes, and slightly ciliate palea.' Thwaites remarks that it is used as horse-fodder at Nuwara Eliya.

5. **A. densifolia,** *Munro in Trans. Linn. Soc.* xxvi. 32 (1868). Gamble, Bamb. Brit. Ind. 8. C. P. 3956.
Fl. B. Ind. vii. 379. Gamble, l. c. t. 7.

A densely gregarious shrub; rootstock stoloniferous, clothed with imbricating scales, stolons giving off stout, strong, densely leafy stems 6 in.–3 ft. high, with fastigiate short branchlets, internodes 1½–3 in. by ⅓ in. diam., rather thick-walled, nodes not prominent, stem-sheaths 1 in. or more, striate, hirsute, tip rather narrowed, truncate, minutely 2-auricled, blade short, ovate, base rounded; l. 1–1½ by ⅕–¼ in., densely imbricate, subsessile, erect, lanceolate, tapering into a setaceously acuminate, glabrous, pungent point, margins broadly cartilaginous, finely spinulose-ciliolate, midrib stout, shining, veins 1–2 pairs, inconspicuous, with 4–5 intermediates and many regular cross-venules, l.-sheaths striate, strigose with white hairs above, margins ciliate, ligule short, rounded, hairy; infl. of short erect racemes 1–1½ in. long, of 6–12 spikelets, terminating leafy branchlets, bracteate by the uppermost leaf, rhachis of raceme and short pedicels rather stout, angular, scabrid; spikelets subsecund, erect, ⅓–½ in. long, laterally compressed, 1-fld., rhachilla short and stout below the flg. glume, very slender and naked above it, with sometimes a rudimentary; glumes 3–4, scaberulous, I subulate-lanceolate, finely acuminate, 3-veined, II much longer, aristately acuminate, 5–7-veined, flg. glume rather longer, 5–7-veined, acuminate, keel strong, palea as long as the glume, 2-toothed, keels scabrous, sides faintly veined; lodicules obovate, obtuse, shortly fimbriate, faintly 3–5-veined; fil. short, anth. included, linear, obtuse, apiculate; ov. oblong, glabrous, styles very short, free; grain unknown.

Montane region. Horton Plains and Pedurutalagala, alt. 7000 ft. Fl. Sept.

Also on the Anamalai Hills.

## 78. BAMBUSA, *Schreb.*

Trees or shrubs, rarely climbing, sometimes thorny; rootstock stout, stem-sheaths usually broad, triangular; l.

linear- or oblong-lanceolate, acuminate, petiole short, l.-sheaths auricled; infl. of leafy or leafless panicled rhachides bearing clusters of 1- or more-fld. spikelets; empty glumes 1–3, flg. ovate-lanceolate, usually mucronate, palea 2-keeled; lodicules 2–3, membranous, usually ciliate; stam. 6, fil. free, anth. narrow, obtuse apiculate or penicillate; ov. oblong or obovoid, top hairy, style short or long, stigmas 1–3; grain oblong or linear-oblong, acute or obtuse, furrowed on one surface, pericarp thin, adherent to the seed, embryo large.—Sp. about 50; 24 in *Fl. B. Ind.*

Stems thorny . . . . . . . . . 1. B. ARUNDINACEA.
Stems unarmed.
  Arboreous, spikelets compressed . . . 2. B. VULGARIS.
  Shrubby, spikelets cylindric . . . . 3. B. NANA.

1. **B. arundinacea,** *Willd. Sp. Pl.* ii. 245 (1799). **Kata-una,** *S.* **Moongil,** *T.*

Thw. Enum. 375. Gamble, Bamb. Brit. Ind. 51. *B. spinosa*, Roxb.; Trim. Cat. Ceyl. Pl. 110. C. P. 3520.

Fl. B. Ind. vii. 395. Roxb. Cor. Pl. t. 79. Gamble, l. c. t. 48. Rheede, Hort. Mal. i. t. 16.

Stems many, tufted on a stout rootstock, branching from the base, up to 80 or 100 ft. high by 6–7 in. diam., graceful, curving, nodes prominent, lowest rooting, lower emitting horizontal almost naked shoots armed at the nodes with 2–3 stout recurved spines sometimes an inch and more long, internodes up to 18 in., walls 1–2 in. thick, stem-sheaths coriaceous, variable in shape, up to 12–15 by 9–12 in., striate, tip rounded, margins plaited, young orange-yellow streaked with green or red and thickly ciliate with golden hairs, blade up to 4 in., triangular, acuminate, glabrous without, densely hirsute within, margins decurrent, thickly ciliate, ligule narrow, entire or fringed with pale hairs; l. up to 7–8 by 1 in., linear or linear-lanceolate, tip stiff, glabrous, or puberulous beneath, one or both margins scabrous, base rounded, ciliate, midrib narrow, veins 4–6 with 7–9 intermediate and a few transverse pellucid glands, l.-sheath ending in a thick callus and short bristly auricle, ligule short; infl. an enormous panicle often occupying the whole stem, branchlets bearing loose clusters of pale, suberect, $\frac{1}{2}$–1 by $\frac{1}{5}$ in., lanceolate, acute, glabrous, spikelets; glumes $\frac{1}{5}$–$\frac{1}{3}$ in. long, ovate-lanceolate, acute or mucronate, many-veined, empty, 2 or 0, flg. 3–7, uppermost 1–3 male or neuter, palea subacute, keels 2, ciliate; lodicules ovate or obovate, hyaline, ciliate, 1–3-veined; fil. slender, anth. obtuse, yellow;

ov. oval-oblong, tip hairy, style short; grain $\frac{1}{5}$–$\frac{1}{3}$ in., oblong, beaked by the style-base, smooth, grooved on one face.

Warmer parts of the Island; common on river banks. Flowers at about thirty years of age (Brandis in 'Indian Forester,' January 1899).

Plains and lower hills of India and Burma, indigenous or cultivated. Cult. in most tropical countries.

One of the most useful Bamboos for constructive purposes. The seeds are eaten by the Sinhalese.

2. **B. vulgaris,** *Schrad. in Wendl. Collect. Pl.* ii. 26. **Una,** *S.* Trim. Syst. Cat. 110. *R. Thouarsii*, Kunth; Thw. Enum. 375. B. arundinacea, Moon, Cat. 26. Gamble, Bamb. Brit. Ind. 43. C. P. 3252.

Fl. B. Ind. vii. 391. Wendl. l. c. t. 47. Gamble, l. c. t. 39.

Stems rather distant, 20–50 ft. by 2–4 in. diam., polished, green or striped with yellow, early branching, nodes hardly raised, girt with a ring of hairs, internodes 10–18 in., walls rather thin, stem-sheaths 6–10 by 7–9 in., top rounded, retuse, thickly appressed-hairy, margins ciliate, often streaked like the stem, blade 2–6 by 3–4 in., subtriangular, acute, appressed-hairy on both surfaces, base decurrent, ending in 2 rounded falcate auricles fringed with flexuous bristles, margins revolute, ligule $\frac{1}{5}$–$\frac{1}{4}$ in. broad, toothed or fimbriate; l. 6–10 by $\frac{2}{3}$–$1\frac{2}{3}$ in., linear-lanceolate, tip slender, twisted, scabrid, glabrous or young hairy beneath, pale green, base rounded or narrowed, margin and adjacent veins scabrid, midrib narrow, pale, veins 6–8 with 8–9 intermediates connected by pellucid gland, l.-sheaths striate, laxly hairy, ending in a smooth ciliate callus and rounded auricle with a few bristles, ligule short, ciliolate; infl. a leafy compound panicle bearing numerous slender rhachides with bracteate clusters of 3–10 suberect spikelets, rhachis terete or sub-furrowed, scurfy, tip hairy; spikelets $\frac{6}{10}$–$\frac{8}{10}$ in. long, oblong, acute, compressed, bifid, 6–10-fld., and a terminal imperfect, rhachilla cuneate, glabrous; empty glumes 1 or 2, ovate, acute, tip ciliate, many-veined, flg. glumes larger, palea obtusely acute, faintly 3-veined, keels 2, white, ciliate; lodicules 3, ciliate, two ovate-oblong, elongate, 3-veined, one longer, acute; stam. exserted, anth. narrow, obtuse, purple, apiculate, tip hairy; ov. narrowly oblong, hairy, narrowed into the long slender hairy style, stigmas 3, short, plumose; grain unknown.

Southern and Central Provinces, up to 2000 ft. elevation (Thwaites). Fl. rarely produced.

Most warm countries, cultivated or naturalised.

Thwaites treats *B. vulgaris* as a native of Ceylon, and Kurz regarded it as indigenous in Java; but Gamble, the highest authority, describes it as not indigenous in India (including Ceylon) or elsewhere, so far as is known. The stems are extensively used for constructive purposes.

3. ***B. nana,** *Roxb. Hort. Beng.* 25 (1814).
Trim. Syst. Cat. Ceyl. Pl. 110. Moon, Cat. 29. C. P. 4022. Gamble, Bamb. Brit. Ind. 41.
Fl. B. Ind. vii. 390. Gamble, l. c. t. 38.

An evergreen shrub; stems tufted 6–10 ft. by $\frac{1}{2}$–1 in. diam., much branched from the base, smooth, green, at length yellow, internodes 8–15 in., nodes thickened, stem-sheaths 4–6 by 2–3 in., slightly narrowed to the rounded top, stiff, striate, glabrous, green, then yellow, blade 2–3 in., linear, acuminate, base decurrent on the sheath, glabrous or appressed hairy above, hairy beneath, margins ciliate with deciduous hairs, ligule narrow, entire; l. distichous, 2–4 by $\frac{1}{2}$ in., linear-lanceolate, tip subulate, twisted, smooth above, whitish or glaucous and puberulous beneath, base rounded or narrowed into the very short petiole, midrib faint, pale beneath, veins 3–6 with 7–8 intermediate, crossed by pellucid glands, l.-sheaths smooth, striate, tipped with a callus, auricles of mouth fringed with a few long stiff bristles, ligule short; infl. a diffuse leafy panicle of slender short rhachides bearing solitary or fascicled spikelets $\frac{1}{2}$–$1\frac{1}{2}$ in. long by $\frac{1}{5}$ in. broad; spikelets 5- or more-fld., terminal fl. alone imperfect, glabrous, straw-col'd., rhachilla $\frac{1}{10}$–$\frac{1}{5}$ in., flattened; empty glumes 0, rarely 1, flg. glumes about $\frac{1}{2}$–$\frac{2}{3}$ in., ovate, acute, glabrous, many-veined, palea shorter, many-veined, keels 2, with ciliolate tips; lodicules 3, unequal, $\frac{1}{10}$–$\frac{1}{5}$ in., linear-lanceolate, usually 2-veined; anth. exserted, linear, pendulous, obtuse or apiculate, yellow; ov. obovoid, rough, pubescent above, style very short, stigmas 3, rather long, penicillate to the base; grain ellipsoid, shortly beaked, furrowed, hirsute above.

Naturalised only (Ferguson). The Dwarf or Chinese Bamboo.
China; cult. throughout India.
Cultivated extensively for close fences. Thwaites observes that the fl. are usually imperfect.

## 79. OXYTENANTHERA, *Munro.*

Small or medium-sized arborescent or scandent unarmed bamboos; rootstock stout, usually creeping and stoloniferous; stem-sheaths various; l. variable, shortly petioled; infl. of clustered, elongate, slender, simple or branched rachides, bearing heads of sessile, elongate, narrowly conical, 1–3-fld. spikelets; glumes I–III empty, flg. glumes ovate, acute, or cuspidate, palea keeled or dorsally rounded; lodicules 0; stam. 6, fil. confluent in a long tube, anth. narrow, exserted; ov. ovoid, style slender, stigmas 1–3; grain elongate, beaked by the style-base, grooved, embryo large.—Sp. 9; 8 in *Fl. B. Ind.*

**O. Thwaitesii,** *Munro in Trans. Linn. Soc.* xxvi. 129 (1868). Gamble, Bamb. Brit. Ind. 73. *Dendrocalamus monadelphus*, Thw. Enum. 376. C. P. 3359.

Fl. B. Ind. vii. 402. Beddome, Fl. Sylv. t. 322. Gamble, l. c. t. 64.

Gregarious, subscandent; stems 10–12 ft. by about 1 in. diam., with whip-like curved tips, bearing whorls of small-leaved branchlets, smooth, nodes prominent, internodes 12–18 in., rough, young hirsute, walls $\frac{1}{10}$–$\frac{1}{5}$ in. thick; stem-sheaths about 6 by 3–4 in., of old stems covered with appressed light brown hairs, of young thinner, glabrous, shining, base leaving a coriaceous ring on the nodes, mouth truncate, margins ciliate, blade 3–5 in., ovate, acuminate, base rounded and decurrent on the top of the sheath, and ending in large rounded auricles with bristly tips, bristles very long and flexuous on the l. of young shoots, ligule of old sheaths very long, fimbriate, of younger narrow, erose; l. variable, of old stems up to 12 by 1–1½ in., lanceolate, acuminate, tip setaceous, twisted, glabrous above, sparsely hairy beneath, base narrowed or rounded, margins scabrous, midrib yellow, veins 8–10 pairs, with 7 intermediates, and many transverse venules in the larger leaves, few or 0 in the smaller, petiole $\frac{1}{10}$–$\frac{1}{5}$ in., l.-sheaths keeled, ending in a rounded callus, and below, in young plants, in 2 auricles, bearing very long flexuous bristles, ligule variable; infl. very large, panicled, leafy, heads of spikelets globose, up to 2 in. diam., bracts small, ovate; spikelets often binate, sessile, stellately spreading, $\frac{3}{10}$–$\frac{4}{10}$ in. long, densely packed, pale, usually 1-fld.; glumes I–III, empty, ovate, mucronate, many-veined, flg. glumes ovate, acute, mucronate, tip often pubescent, margins ciliate, palea convolute, obtuse, tip ciliate; stam.-tube at first short, thick, then elongate, membranous, anth. subsessile on the tube, narrow, tip long, hairy; ov. ovoid, pubescent, style long, slender, hairy, stigmas 3, stigmatic hairs short; grain oval-oblong, glabrous, except the style-base.

Central Province, alt. 4–6000 ft.; common. Flowers frequently in March.

Also in Nilgiri and Anamalai Hills.

### 80. TEINOSTACHYUM, *Munro.*

Shrubby or arborescent Bamboos; stems rather slender, drooping from an erect base, stem-sheaths slender, blade recurved; l. variable; infl. a slender terminal rhachis, bearing sessile bracteate fascicles of long, narrow, subterete, many-fld., suberect spikelets, upper and lower fl. imperfect; glumes distichous, I and II empty, ovate, acuminate or mucronate,

flg. glumes similar, but longer, mucronate, palea oblong, convolute, keels 2, ciliate; lodicules 3, persistent, 3–9-veined; stam. 6, fil. slender, free, anth. exserted; ov. ovoid or depressed-globose, pericarp produced upwards into a tube enclosing the slender style, stigmas 2–3; grain ovoid, acuminate, beaked, pericarp crustaceous.—Sp. 5; all in *Fl. B. Ind.*

**T. attenuatum,** *Munro in Trans. Linn. Soc.* xxvi. 143 (1868).
Beddome, Fl. Sylv., For. Man. p. ccxxxiv. Trim. Cat. Ceyl. Pl. 110. *Bambusa attenuata*, Thw. Enum. 375. C. P. 3255. Gamble, Bamb. Brit. Ind. 100.
Fl. B. Ind vii. 410. Gamble, l. c. t. 88.

Stems tufted, 12–25 ft. high, ½–1 in. diam., tips very slender, nodes with many whorled leafy branches; stem-sheaths pale, appressedly hairy; l. thin, 3–6 by ½–1 in., lanceolate, acuminate, tip subulate, twisted, scabrous, smooth or rather rough above, smooth and pale beneath, midrib not prominent, base rounded or cordate, veins 3–5 pairs, with 5–7 close-set intermediates crossed by pellucid glands, margins ciliate, petiole $\frac{1}{10}$–⅛ in., l.-sheaths sparingly appressed hairy or glabrous, mouth truncate, fringed with short deciduous hairs, margins scaberulous, ligule short, entire, glabrous; infl. terminal, and from the ends of the whorled branches, elongate, very slender, falcate or drooping at the tip, spikelets in whorled clusters of fertile and sterile bracts, 1–1½ in. long, lanceolate, finely acuminate, rhachis smooth; spikelets narrow, 1 by ⅕ in., rhachilla terete, smooth, thickened above; glumes 5–6, I ⅓ in., ovate, mucronate, ciliate, empty, 7-veined, flg. glumes 2–3, with 1–2 upper imperfect, longer than I, 9–11-veined, palea smaller than the glume, keels 2, ciliolate; lodicules lanceolate, 3-veined, tips ciliate; fil. long, twisted, anth. ⅛ in. long, obtusely mucronate; ov. ovoid, acuminate, glabrous, style long, stigmas 3, long, purple, stigmatic hairs, short, simple; grain narrowed at both ends, beaked, glabrous.

Central Province, alt. 4000–6000 ft. Ramboda, Hakgalla, &c. (Thwaites). Upper Abbotsford, in fl. and fr. May 1879, and January and February 1880 (Ferguson).

Endemic.

Extensively used for basket-making and other purposes in Dambulla (Ferguson).

### 81. OCHLANDRA, *Thw.*

Shrubby, gregarious, slender bamboos; stems erect, internodes thin-walled, stem-sheaths persistent, auricles small; l. lanceolate, many-veined, margins sometimes cartilaginous, l. sheaths striate, fringed, ligule short or long; infl. of elongate,

naked, solitary or fascicled rhachides terminating leafy branchlets; spikelets whorled, stellately spreading, lanceolate, terete, rigid, sterile and fertile intermixed, 1-fld.; glumes many, convolute, mucronate, lower I–V empty, lowest very short, cupular, succeeding gradually longer, all rigidly coriaceous, obscurely very many-veined, smooth, polished, flg. glume longest, solitary, palea membranous, many-veined, not keeled; lodicules 1 or more; stam. 6–120, fil. free or connate, exserted at the top of the spikelet, anth. long, narrow; ov. narrow, style elongate, stigmas 4–6, short, stigmatic hairs short; grain very large, ovoid or lanceolate, long-beaked by the rigid exserted style, embraced by the persistent glumes, pericarp very thick, fleshy.—Sp. 7; all in *Fl. B. Ind.*

**O. stridula,** *Thw. Enum.* 376 (1864). **Bata-li,** *S.*
Beddome, Fl. Sylv., For. Man. p. ccxxxiv. Gamble, Bamb. Brit. Ind. 123. *Beesha stridula*, Munro in Trans. Linn. Soc. xxvi. 145. *Bambusa stridula*, Moon, Cat. 26. C. P. 241.
Fl. B. Ind. vii. 419. Gamble, l. c. t. 109.

Gregarious; stems crowded, 6–18 ft. by $\frac{1}{4}$–$\frac{3}{4}$ in. diam., pale green, nodes geniculate, internodes 12–20 in. long, scabrous, stem-sheaths glabrous, top rounded, auricles falcate, bristly, blade subulate, recurved, ligule short; l. 8–12 by $1\frac{1}{2}$–$2\frac{1}{2}$ in., oblong-lanceolate, tip long, setaceous, scabrid, smooth above, margins subcartilaginous, reflexed, one scabrous, midrib slender, veins 10–12 pairs, with about 7 intermediates crossed obliquely by pellucid glands, petiole short, stout, concave, l.-sheaths ending in a narrow callus fringed with deciduous bristles sometimes $\frac{1}{2}$ in. long, young hirsute, old glabrous, ligule narrow, glabrous; rhachides elongate, rough at the articulations, glaucous above them; spikelets up to 1 in. long by $\frac{1}{5}$ in. diam., cylindric-conical, glabrous or sparsly hirsute; glumes persistent in fr., I and II $\frac{1}{5}$–$\frac{1}{2}$ in. long and broad, margins naked or ciliate, flg. glume similar but longer, palea as long as the flg. glume, membranous, oblong, truncate, veins many, trabeculate; lodicules 6–12 or more, lanceolate, one-, few-, or many-veined, convolute, appressed to the fr. and persistent; stam. up to 30, fil. free, flat, anth $\frac{1}{2}$ in., 2-toothed, mucronate in the sinus; ov. narrow, smooth, style enclosed in the produced trigonous tip of the pericarp, stigmas 4–5, at first twisted; grain about 1 in. long, beak as long, subtended by the persistent glumes, palea, lodicules, and filaments.

Var. **maculata,** *Gamble, l. c.* 124.

Stem greyish-green, banded and blotched with dark purple Fl. B. Ind. l. c. *Teinostachyum* (?) *maculatum*, Trim. in Journ. Bot. xxiii. (1885), 273.

Southern Provinces, in the low country; common. Covering hundreds of square miles. Flowers annually. Var. *maculata*, Ambagamuwa, Rewanwette, and districts S. of Adam's Peak (Ferguson).

Endemic.

Moon's specific name is derived from the stems when trodden on breaking with a crackling noise, warning game of the hunter's approach. Stems extensively used for fences, roofs of huts, and leaves for thatching (Ferguson). According to Thwaites, var. *maculata* loses its purple colour under cultivation, and does not flower.

# APPENDIX I.

## A.

### *Key to the Orders, Genera, and Aberrant Species of Ceylon Flowering Plants.*

It is assumed that those for whose aid in identifying the flowering plants of Ceylon the following Key is intended are so far instructed in the elements of botany as to be familiar with the principles of classification, with the characters of the classes Dicotyledons, Monocotyledons, and Gymnosperms, with the principal organs of flowering plants, and with the technical terms ordinarily used in describing them.*

These acquirements would not, however, suffice to enable any one ignorant of Indian botany to make much use of this Hand-book, from the absence in it of subdivisions of the dicotyledons and monocotyledons, and from the fact that many of the genera present some characters foreign to the orders in which they are placed, but to which they, notwithstanding, belong by right of affinity. Added to this is the fact that the Ceylon Flora is, for its extent, a fragmentary one, certain orders represented in India by many genera, and certain genera by many species in India, being represented in Ceylon by single or very few genera and species, and these often being aberrant in one or more characters. In evidence of the above I find that, out of the total of 149 orders, 49 are represented by single genera, and 23 by only two genera; and that, of the remaining 77 orders, 65 include one or more genera with aberrant species. One instance of the latter may suffice; it is the order *Ranunculaceæ*, which is normally polypetalous. It is represented in Ceylon by five

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* Those who have not these acquirements are recommended to procure and study 'Oliver's First Book of Indian Botany,' with numerous illustrations. (Macmillan & Co.)

genera, of which three are apetalous. These five genera together contain seven species, of which three only have petals. This, for the purpose of the Key, necessitates *Ranunculaceæ* finding a place both in the polypetalous series of *Thalamifloral* and the apetalous of *Monochlamyds*. So it is with various others of the Ceylon orders, genera, and species; owing to their aberrant characters their natural affinities are masked, and, except by an artificial key, it is difficult—in some cases even impossible—for one ignorant of Indian botany to identify them, and to find their places in the natural system which is followed in the body of the Hand-book.

The following table shows the limits of the Series, and the Parts of the Hand-book in which they are to be found :—

I. **Dicotyledons.**

Series I. Thalamifloral, Part i, Orders I, Ranunculaceæ, to XXIV, Tiliaceæ.

,, II. Discifloral, Part i, Orders XXV, Linaceæ, to XLII, Anacardiaceæ.

,, III. Calycifloral, Part ii, Orders LVI, Connaraceæ, to LXV, Cornaceæ.

,, IV. Gamopetalous, Part ii, Orders LXVII, Rubiaceæ, to Part iii, CI, Plantagineæ.

,, V. Monochlamydeous,<br>,, VI. Achlamydeous, } Part iii, Orders CII, Nyctagineæ, to Part iv, Orders CIII, Euphorbiaceæ, to CXXII, Ceratophyllaceæ.

II. **Gymnosperms.** Part iv, Orders CXXIII, Cycadaceæ.

III. **Monocotyledons.**

Series I. Petaloid<br>,, II. Apetaloid } Part iv, Orders CLXXIV, Hydrocharideæ, to CXLVI, Naiadeæ, Part v, Order CXLVII, Eriocauloneæ.

,, III. Glumal, Part v, Orders CXLVIII, Cyperaceæ, and CXLIX, Gramineæ.

## Class I.—DICOTYLEDONS.

Series I.—**Thalamifloral.** Fl. usually bisexual and regular; cal. inferior, except *Ancistrocladeæ*, of distinct or connate sepals; cor. of distinct pet., sometimes united at the very base; stam. hypogynous, rarely inserted on a hypogynous disk or torus.

Fl. unisexual in *Menispermaceæ;* irregular in *Viola*, *Impatiens*, and *Polygala;* pet. 0 in some *Ranunculaceæ*, *Cruciferæ*, *Violaceæ*, *Bixaceæ*, and rarely in a few other orders.

A. Ov. apocarpous, of 2 or more free carpels, rarely carpel solitary.
Fl. bisexual.
Sep. 5 or fewer, pet. 1-seriate.
Sep. deciduous . . . I. RANUNCULUS, vol. i. p. 4.
Sep. persistent . . . II. DILLENIACEÆ, i. 5.
Sep. and pet. 2–3 seriate, or sep. 1-seriate and pet. 2- or more-seriate.
Shrubs or trees.
L. stipulate, sep. 5 or more . III. MAGNOLIACEÆ, i. 14.
L. exstipulate, sep. 3 . . IV. ANONACEÆ, i. 16.
Aquatic herbs . . . VII. NYMPHÆACEÆ, i. 49.
Fl. unisexual, diœcious . . . V. MENISPERMACEÆ, i. 37.

B. Ov. syncarpous.
Ov. 1-celled, spuriously 2-celled in *Cruciferæ.*
Placentas parietal.
Endosperm 0.
Ov. spuriously 2-celled . VIII. CRUCIFERÆ, i. 52.
Ov. 1-celled, usually on a gynophore . . . IX. CAPPARIDEÆ, i. 54.
Endosperm copious.
Fl. irregular.
Stam. 5, anth. spurred . X. VIOLACEÆ, i. 65.
Stam. 8, anth. not spurred XIII. POLYGALACEÆ, i. 78.
Fl. regular.
Herbs with glandular hairs XLVIII. DROSERACEÆ, ii. 145.
Trees or shrubs.
Stam. many, in 1 or 5 bundles . . XVIII. HYPERICACEÆ, i. 93.
Stam. 5 or more, not in bundles.
Fr. capsular placent. 2 XII. PITTOSPORACEÆ, i. 77.
Fr. berried, placent. 3 or more . . XI. BIXACEÆ, i. 69.
Placenta free central or basal.
Sep. and pet. and stam. 6 each, shrub . . . . VI. BERBERIDEÆ, i. 48.
Sep. 5 or cal. 5-fid.
Ov. inferior, scandent shrub XXI. bis. ANCISTROCLADEÆ, i. 138.
Ov. superior.
Herbs, l. opp. . . . XIV. CARYOPHYLLACEÆ, i. 84.
Trees or shrubs, l. scale-like XVI. TAMARISCINEÆ, i. 91.
Shrubs, l. alt., broad . LXXVIII. MYRSINEÆ, iii. 67.
Ov. 2–many-celled.
Sep. imbricate in bud.
Ov. cells many-ovuled.
Fl. irregular . . . IMPATIENS, i. 200.
Fl. regular
L. opp.
Stam. 3–10 free . . XVII. ELATINEÆ, i. 92.
Stam. many, in 1 or bundles . . . XVIII. HYPERICACEÆ, i. 93.
L. alt., trees or shrubs.
Sep. unchanged in fr. . XX. TERNSTRŒMIACEÆ, i. 107.
Sep. accrescent in fr. . XXI. DIPTEROCARPACEÆ, i. 112.

L. radical or whorled, herbs — Mollugo, ii. 270.
Ov. cells 1–4-ovuled.
Trees or shrubs.
L. alt., pet. connate at base XXXVI. Ilicineæ, i. 264.
L. opp., fl. usually unisexual.
Cal. campanulate, spiny shrub . . . Azima, iii. 121.
Cal. of distinct sepals . XIX. Guttiferæ, i. 94.
Cal. 5-partite, pet. laciniate — Weihea, ii. 156.
Herbs, l. simple or comp. . XXVIII. Geraniaceæ, i. 195.
Sep. valvate in bud.
Anth. 1-celled . . . . XXII. Malvaceæ, i. 140.
Anth. 2-celled.
Fil. free . . . . XXIV. Tiliaceæ, i. 171.
Fil. monadelphous . . XXIII. Sterculiaceæ, i. 163.

Series II.—**Discifloral.** Fl. usually bisexual and regular; calyx inferior; pet. distinct or connate at the very base, with usually a perigynous or hypogynous disk or row of glands between their insertion and the ov.; stamens inserted on or at the inner or outer base of the disk, or between the glands, or on the pet.

Disk glands very minute in *Chailletiaceæ*. Cal. superior, and disk epigynous in *Strombosia* (*Olacineæ*).

A. Fl. regular.
Fr. of separate carpels.
L. gland-dotted . . . XXIX. Rutaceæ, i. 213.
L. not gland-dotted.
L. opp.
L. simple.
Sep. pet. and stam. very many . . . CXII. Monimiaceæ, iii. 436.
Sep. 5, pet. 5–6, stam. 3. Hippocratea, i. 275.
L. pinnate . . . . XXVII. Zygophyllaceæ, i. 194.
L. alt. stipulate . . . XXXI. Ochnaceæ, i. 232.
L. alt. exstipulate.
L. compound.
Stam. inserted chiefly outside the disk . XXX. Simarubaceæ, i. 229.
Stam. inserted chiefly inside the disk . XL. Sapindaceæ, i. 298.
L. simple . . . . Buchanania, i. 316.
Fr. syncarpous.
Herbs.
Terrestrial.
L. stipulate, stam. many . XXIV. Tiliaceæ, i. 171.
L. stipulate, disk of glands — Geranium, i. 195.
L. exstipulate, disk of glands or scales . Linum, i. 188.
Aquatic herbs, disk adnate to ov.
Whole plant floating, fl. small — Trapa, ii. 235.
L. and fl. only floating, fl. large — Nymphæa, i. 49.
Trees or shrubs. (See also some discifloral petaliferous gen. of *Euphorbiaceæ*.)
Stam. 5 or fewer opp. or on the pets.
L. simple.

Pet. valvate.
Undershrubs with tendrils — VITIS, i. 287.
Shrubs, no tendrils . XXXV. OLACINEÆ, i. 254.
Pet. minute, imbricate, or involute . . XXXVIII. RHAMNACEÆ, i. 278.
L. compound, no tendrils . LEEA, i. 297.
Stam. alt., or opp. and alt. with the pets., or many.
L. alt. exstipulate.
L. gland-dotted . . XXIX. RUTACEÆ, i. 213.
L. not gland-dotted.
Ov. 1-celled, ovules many, on 3–5 parietal placentas XI. BIXACEÆ, i. 69.
Ov. 1 or more celled, placentas basal or axile.
L. simple.
Pet. valvate . . XXXV. OLACINEÆ, i. 254.
Pet. imbricate.
Disk of glands, styles 3–5 . XXV. LINACEÆ, i. 188.
Ov. 2–5-celled, style 2–3-fid. XXXVII. CELASTRACEÆ, i. 266.
Ov. 1 - celled, style simple . XLII. ANACARDIACEÆ, i. 316.
Ov. 2–5-celled, style simple . XL. SAPINDACEÆ, i. 298.
L. compound.
Fil. confluent, forming a tube . XXX. MELIACEÆ, i. 241.
Fil. distinct.
Ovules pendulous.
Ov. 1-celled, 1-ovuled . XLII. ANACARDIACEÆ, i. 316.
Ov. 2–3-celled, cells 1–2-ovuled . XXXII. BURSERACEÆ, i. 235.
Ovules erect.
Ov. cells many-ovuled . CHLOROXYLON, i. 252.
Ov. cells 1–2-ovuled. . XL SAPINDACEÆ, i. 298.
L. alt., stipulate.
Anth. appendaged, ov. 1-celled ALSODEIA, i. 68.
Anth. not appendaged, trees or shrubs, except *Linaceæ.*
Stam. many . . XXIV. TILIACEÆ, i. 171.
Stam. 3–5.
Ov. 3–5-celled . . XXV. LINACEÆ, i. 188.
Ov. 2-celled.
Ov. pendulous . XXXIV. CHAILLETIACEÆ, i. 253.
Ov. erect . . XXXV. CELASTRACEÆ, i. 266.
L. opp., trees or shrubs.
L. gland-dotted, simple.
L. exstipulate, stam. 8 ACRONYCHIA, i. 216.
L. stipulate, stam. 5 . KOKOONA, i. 269.
L. not gland-dotted.
L. stipulate, compound TURPINIA, i. 313.

| | |
|---|---|
| L. exstipulate. | |
| L. simple . . | XXXVI. CELASTRACEÆ, i. 266. |
| L. compound . . | XL. SAPINDACEÆ, i. 298. |
| B. Fl. irregular, trees or shrubs. | |
| L. opp., simple, exstipulate . . | XXVI. MALPIGHIACEÆ, i. 192. |
| L. alt., simple and compound. | |
| Stam. 5–10 . . . . . | XL. SAPINDACEÆ, i. 298. |
| Stam. (perfect) 2, opp. 2 of 5 petals | XLI. SABIACEÆ, i. 314. |

SERIES III.—**Calycifloral.** Fl. regular, mostly bisexual; calyx inferior or superior; pet. distinct, or connate at the very base only; disk 0, or very obscure; stam. inserted in the limb of the calyx.

In the genera and orders with inferior ov., the limb of the calyx is often undeveloped, which should refer them technically to the Monochlamydeous division, where also most such will be found.

| | |
|---|---|
| A. Fl. bisexual. | |
| Ov. superior (or half superior in *Trapa* and *Ficoideæ*). | |
| Herbs. | |
| Fr. a solitary follicle, l. alt. usually comp. . . | XLIV. LEGUMINOSÆ, ii. 4. |
| Fr. of small achenes, l. comp. | XLV. ROSACEÆ, ii. 134. |
| Fr. capsular. | |
| Sep. 2, embryo annular . | XV. PORTULACACEÆ, i. 88. |
| Sep. 3–5, embryo straight . | AMMANNIA, ii. 223. |
| Fr. an indehiscent 2-horned nut, aquatic . . . | TRAPA, ii. 235. |
| Trees or shrubs. | |
| Fr. of many small drupes, prickly shrubs . . | RUBUS, ii. 135. |
| Fr. of 3–5 follicles, l. imp.-pinnate . . . . | XLIII. CONNARACEÆ, ii. 1. |
| Fr. of 1 follicle, 1-seeded, l. of 1 leaflet . . . . | ELLIPANTHUS, ii. 3. |
| Fr. various. | |
| Ov. 1-celled, style single, l. alt., stipulate. | |
| L. usually comp., fr. follicular or indehiscent | XLIV. LEGUMINOSÆ, ii. 4. |
| L. simple, fr. a berry . | PYGEUM, ii. 134. |
| Ov. 2- or more-celled, style single, l. opp. | |
| Anth. opening by slits. | |
| Style long, stigma capitate, l. exstipulate . | LIV. LYTHRACEÆ, ii. 222. |
| Stigma 2-lobed, or styles 2, l. exstipulate . . | LXXXII. OLEACEÆ, iii. 112. |
| Stigma simple, l. stipulate | L. RHIZOPHORACEÆ, ii. 150. |
| Anth. opening by pores . | MELASTOMA, ii. 199. |
| Ov. 1-celled, styles 4 or more. | |
| Sep. 5, placent. parietal . | HOMALIUM, ii. 239. |
| Sep. 2, placent. basal . | XV. PORTULACACEÆ, i. 88. |
| Ov. inferior. | |
| Stam. inserted on the calyx-limb. | |
| Anth. opening by pores . . | LIII. MELASTOMACEÆ, ii. 192. |
| Anth. opening by slits. | |
| Leafless shrubs . . . | LXI. CACTACEÆ, ii. 266. |

| | | |
|---|---|---|
| Leafy shrubs or trees. | | |
| Pet. valvate . . . | | STROMBOSIA, i. 257. |
| Pet. imbricate, distinct. | | |
| L. stipulate. | | |
| Ov. 1-celled . . | | PHOTINIA, ii. 142. |
| Ov. 2–4-celled . . | L. | RHIZOPHORACEÆ, ii. 150. |
| L. exstipulate, ov. 1-celled | LX. | COMBRETACEÆ, ii. 158. |
| Pet. connate in a cap . | | AXINANDRA, ii. 231. |
| Stam. epipetalous, shrubs or trees. | | |
| Pet. imbricate, stam. very many | LXXXI. | STYRACEÆ, iii. 103. |
| Pet. valvate, stam. opp. pet. or adnate to them . . | CXVII. | LORANTHACEÆ, iii. 462. |
| Stam. epigynous. | | |
| Pet. valvate. | | |
| L. compound, ov. 4–9 celled | LXIV. | ARALIACEÆ, ii. 281. |
| L. simple. | | |
| Ov. 1-celled, shrubs . | LXV. | CORNACEÆ, ii. 285. |
| Ov. 2-celled, herbs . . | | HYDROCOTYLE, ii. 274. |
| Pet. imbricate. | | |
| Fl. umbelled, styles 2 . . | LXIII. | UMBELLIFERÆ, ii. 274. |
| Fl. not umbelled. | | |
| L. stipulate . . . | L. | RHIZOPHORACEÆ, ii. 150. |
| L. exstipulate. | | |
| Pet. entire, l. opp. . | LII. | MYRTACEÆ, ii. 165. |
| Pet. laciniate, l. alt. dimorphic . . | | ANISOPHYLLEA, ii. 157. |
| B. Fl. unisexual (see also various petaliferous *Euphorbiaceæ*). | | |
| Scandent herbs or shrubs with tendrils. | | |
| Fl. monœcious, fr. baccate. . | LVIII. | CUCURBITACEÆ, ii. 242. |
| Fl. diœcious, fr. capsular . . | LVII. | PASSIFLORACEÆ, ii. 239. |
| Erect herbs. | | |
| Ov. 4-celled, cells 1-ovuled . | | SERPICULA, ii. 147. |
| Ov. 3-celled, cells many-ovuled. | LXIX. | BEGONIACEÆ, ii. 262. |
| Parasitic shrub, anth. opening by many pores . . . . | | VISCUM, iii. 470. |

SERIES IV.—**Gamopetalous.**—Fl. usually bisexual, regular or irregular; cal. superior or inferior; pet. connate, forming an entire or cleft corolla, rarely free to a little above the base; stam. epipetalous, rarely hypogynous or epigynous.

| | | |
|---|---|---|
| A. Ov. inferior, ½ inferior in *Sphenoclea* (see below) and in *Gaertnera* (see *Loganiaceæ*). | | |
| Stam. epipetalous. | | |
| Anth. free. | | |
| Stam. opp. or upon the cor.-lobes . . . | CXVII. | LORANTHACEÆ, iii. 462. |
| Stam. alt. with cor.-lobes. | | |
| L. opp. exstipulate. | | |
| Stam. 3, herb. . . | LXVIII. | VALERIANACEÆ, iii. 1. |
| Stam. 4, ov. 1-celled, herb . . . | LXIX. | DIPSACEÆ, iii. 2. |
| Stam. 5, ov. 1–3-celled, shrub . . | LXVI. | CAPRIFOLIACEÆ, ii. 288. |

| | |
|---|---|
| L. opp. stipulate, or whorled . . . | LXVII. RUBIACEÆ, ii. 289. |
| L. alt. | |
| Stam. very many, shrubs or trees . . . | LXXX. STYRACEÆ, iii. 103. |
| Stam. 5, fil. free, ov. ½ inferior, herb . . | SPHENOCLEA, iii. 59. |
| Stam. 5, fil. united, fl. unisexual, coarse herb . | XANTHIUM, iii. 35. |
| Anth. connate. | |
| Anth. cohering by their tips only | ACRANTHERA, ii. 324. |
| Anth. cohering in a tube. | |
| Herbs or shrubs with tendrils . . . | LVIII. CUCURBITACEÆ, ii. 242. |
| Herbs, l. stipulate . | NEUROCALYX, ii. 299. |
| L. exstipulate, ov. 1-celled, 1-ovuled . | LXX. COMPOSITÆ, iii. 3. |
| L. exstipulate, ov. 2–3-celled, many-ovuled | LXXIII. CAMPANULACEÆ, iii. 55. |
| Stam. epigynous. | |
| Stam. 2, fil. confluent with style . . . . | LXXI. STYLIDIACEÆ, iii. 53. |
| Stam. 3–5. | |
| Ov. 1-celled, 1-ovuled, stam. opp. cor.-lobes | CXVII. LORANTHACEÆ, iii. 462. |
| Ov. 2-celled, cells 1-ovuled | LXXII. GOODENIACEÆ, iii. 54. |
| Ov. 2–3-celled, cells many-ovuled . . . | LXXIII. CAMPANULACEÆ, iii. 55. |
| Stam. 10, anth.-cells spurred | LXXIV. VACCINIACEÆ, iii. 61. |
| B. Ov. superior. | |
| Fl. regular. | |
| Stam. hypogynous. | |
| Ov. 1-celled, ovule, 1 pendulous, herbs . . | LXXVI. PLUMBAGINEÆ, iii. 64. |
| Ov. 1-celled, 2-ovuled, herb | WALTHERIA, i. 170. |
| Ov. 1-celled, 1-ovuled, woody unisexual climbers. | |
| Sep. of male distinct . | CISSAMPELOS, i. 46. |
| Sep. of male connate . | CYCLEA, i. 47. |
| Ov. 5–10-celled, cells many-ovuled, shrubs or trees . . . | LXXV. ERICACEÆ, iii. 62. |
| Stam. epipetalous. | |
| Ov. of 2 free carpels with connate styles or stigmas. | |
| L. opp. | |
| Pollen granular, grains free . . . | LXXXIV. APOCYNACEÆ, iii. 123. |
| Pollen in waxy or granular masses | LXXXV. ASCLEPIADEÆ, iii. 142. |
| L. alt., carpels each 2-lobed | CERBERA, iii. 128. |
| Ov. of 2 or more confluent carpels. | |
| Ov. 1-celled, placenta free central, stam. opp. cor.-lobes. | |
| Herbs, fr. capsular . | LXXVII. PRIMULACEÆ, iii. 65. |
| Trees or shrubs, fr. baccate . . | LXXVIII. MYRSINEÆ, iii. 67. |
| Tree or shrub, fr. a follicle | ÆGICERAS, iii. 74 |

Ov. 1 or more celled, placenta not free central.
L. opp., rarely ternate.
Trees or shrubs.
Stam. 2, ov. 2-celled, cells 1-ovuled . LXXXII. OLEACEÆ, iii. 112.
Stam. 4–5.
Anth. connivent, adnate to stigmas . LXXXIV. APOCYNACEÆ, iii. 123.
Anth. free.
Ov. 1-celled, placent. 2, parietal WILLUGHBEIA, iii. 123.
Ov. 1-4-celled, placent. axile or sub-basal.
Stam. didynamous XCIX. VERBENACEÆ, iii. 345.
Stam. equal.
Spinous shrubs CARISSA, iii. 124.
Unarmed shrubs.
Cor.-lobes imbricate SALVADORA, iii. 120.
Cor.-lobes valvate or contorted LXXXVI. LOGANIACEÆ, iii. 169.
Stam. 6–8, ov. 2–4-celled, ovules 4 SYMPHOREMA, iii. 362.
Herbs.
Ov. 1-celled, placent. parietal, ovules very many.
Corolla-lobes contorted, stigmas 2 GENTIANACEÆ, iii. 179.
Corolla-lobes imbricate, stigma 1 CHAMPIONIA, iii. 276.
Ov. 2-celled.
Stam. 2, ov. cells 2-ovuled STACHYTARPHETA, iii. 348.
Stam. 4–5, ov. cells many-ovuled.
Styles 2, very short MITRASACME, iii. 170.
Style 1, long EXACUM, iii. 180.
Ov. 4-celled, ovules 4, anth. 5, connate TRICHODESMA, iii. 201.
L. alt.
Aquatic herb, l. floating, ov. 1-celled . LIMNANTHEMUM, iii. 188.
Terrestrial caulescent herbs, shrubs, or trees.
Ov. 1-celled, ovules 4, erect, scandent shrubs ERYCIBE, iii. 204.
Ov. 1-celled, ovules many, parietal, undershrub ISANTHERA, iii. 280.
Ov. 2- or 4-celled, ovules 4.
Corolla plaited in bud . XC. CONVOLVULACEÆ, iii. 204.
Corolla-lobes imbricate in bud . . LXXXIX. BORAGINEÆ, iii. 192.
Ov. 2-celled, cells many-ovuled.

Annual, stam. 4, style 1 — Celsia, iii. 240.
Annual, stam. 5, styles 2 — Hydrophyllaceæ, iii. 191.
Herbs or shrubs,
stam. 5, style 1 — xci. Solanaceæ, iii. 230.
Ov. 3–16-celled, cells 1–2-ovuled, shrubs or trees.
Fl. bisexual.
L. simple . — lxxix. Sapotaceæ, iii. 75.
L. compound — Leea, i. 297.
Fl. unisexual.
Styles 3, 2-fid. — Givotia, iv. 50.
Style single, or bifid.
Pet. contorted, sep.
accrescent — lxxx. Ebenaceæ, iii. 87.
Pet. imbricate,
stam. 2 — lxxxii. Oleaceæ, iii. 112.
L. all radical, perennial herb . . — ci. Plantagineæ, iii. 388.
Fl. irregular (corolla-lobes, or stamens, or both unsymmetrical).
Leafless herbs.
Stam. 4, didynamous, anth. 1-celled.
Ov. 1-celled, placent. 2,
parietal . . . — xciii. Orobanchaceæ, iii. 260.
Ov. 2-celled, placent. 2, axile — Striga, iii. 255.
Stam. 2, anth.-cells confluent — xciv. Lentibulariaceæ, iii. 266.
Leafy herbs, shrubs, or trees.
Anth. 1-celled.
Ov. 4-lobed . . . — c. Labiatæ, iii. 364.
Ov. entire, 2-celled, stam. 2, annuals.
Capsule many-seeded, stigma
tongue-shaped . — Peplidium, iii. 254.
Capsule 4-seeded, stigma
simple . . — Monothecium, iii. 333.
Anth.-cells 2, confluent.
Ov. 1-celled.
Stam. 2 or 4, placent.
2, parietal . . — xcv. Gesneraceæ, iii. 271.
Stam. 2, placent. basal — xciv. Lentibulariaceæ, iii. 266.
Ov. 2-celled, l. opp., herbs.
Fl. minute, axillary . — Microcarpæa, iii. 254.
Fl. large, racemose . — Artanema, iii. 248.
Anth.-cells 2, distinct.
Ov. 1-celled, placent. 2, parietal, stam. 1, herbs.
Corolla unequally 4-lobed — Hoppea, iii. 183.
Corolla 2-lipped . — Canscora, iii. 183.
Ov. 1-celled, or 2-celled by confluence of placent. stam. didynamous.
Shrubs or trees, l. 1–2-
pinnate . . — xcvi. Bignoniaceæ, iii. 280.
Ov. 2-celled, l. usually opp., simple lobed or pinnatifid, stam. usually didynamous.
Ov. cells many-ovuled, fr. usually capsular.
L. opp., alt., or whorled, endosp. fleshy . — xcii. Scrophulariaceæ, iii. 239.
L. opp. or alt., endosp. 0 — Sesamum, iii. 285.

| | |
|---|---|
| L. all opp., endosp. o (except *Elytraria*) . . | XCVIII. ACANTHACEÆ, iii. 286. |
| Ov. cells 1–few-ovuled. | |
| L. opp. or whorled, fr. dry or a drupe . . | XCIX. VERBENACEÆ, iii. 345. |
| L. all opp., capsule 2-valved . . | XCIII. ACANTHACEÆ, iii. 286. |
| L. all opp., fr. indehiscent, spinous | PEDALIUM, iii. 284. |
| Ov. 4-celled, l. opp., stam. didynamous. | |
| Ov. entire, style terminal | XCIX. VERBENACEÆ, iii. 345. |
| Ov. 4-lobed, style from between the lobes . | C. LABIATÆ, iii. 364. |

SERIES V.—**Monochlamyds.**—Fl. usually regular, often unisexual; perianth single, present in bisexual fls., and usually in both sexes of unisexual fls., superior or inferior, gamo- or polypetalous; stam. hypogynous, perigynous, or epigynous.

Under this series are included some orders and genera with inferior ovaries, in which the calyx-limb is not or hardly produced, though, the calyx-tube being present in these and adnate to the ovary, they are really dichlamydeous.

A. Ov. inferior.

| | |
|---|---|
| Stam. confluent with the style | ARISTOLOCHIA, iii. 422. |
| Stam. free from the style. | |
| Anth. connate in a tube, fil. free, ov. 1-celled, 1-ovuled . . . | LX. COMPOSITÆ, iii. 3. |
| Anth. free. | |
| Aquatic unisexual herb, ov. 4-celled, 4 ovuled | MYRIOPHYLLUM, ii. 148. |
| Terrestrial plants. | |
| Ov. 1-celled, 1-ovuled. | |
| Anth. opening by slits or pores. | |
| L. large, peltate . | HERNANDIA, iii. 455. |
| L. not peltate, parasites . . | CXVII. LORANTHACEÆ, iii. 462. |
| Anth. opening by valves . . | GYROCARPUS, ii. 165. |
| Ov. 1-celled, 2–5-ovuled. | |
| Stam. 3–5, style 1 . | SANTALACEÆ, iii. 474. |
| Stam. 8–10, style 1 . | LI. COMBRETACEÆ, ii. 158. |
| Stam. 4, styles 4, stigmas plumose | SERPICULA, ii. 148. |
| Ov. 1-celled, many-ovuled . . | LX. DATISCACEÆ, ii. 265. |
| Ov. 2-celled, 2-ovuled. | LXIII. UMBELLIFERÆ, ii. 274. |
| Ov. 4–9-celled, cells 1-ovuled . . | LXIV. ARALIACEÆ, ii. 281. |
| Ov. 4-celled, cells many-ovuled . | BRAGANTIA, iii. 421. |

B. Ov. superior.
  Fl. bisexual.
    Aquatic herbs, with frond-like stem . . . Lawia, iii. 416.
    Leafless, fleshy, jointed herbs civ. Chenopodiaceæ, iii. 406.
    Leafless twining parasite . Cassytha, iii. 455.
    Leafy herbs, shrubs, or trees.
      Perianth-tube elongate, base enclosing the ov.
        Tube of perianth entire, limb 4–5-lobed.
          Stam. 4–5, inserted on the perianth tube.
            L. glabrous or pubescent . cxv. Thymelæaceæ, iii. 457.
            L. covered with lepidote scales . cxvi. Elæagnaceæ, iii. 461.
          Stam. 2–10, hypogynous . . cii. Nyctagineæ, iii, 389.
        Tube of perianth (calyx) entire or obscurely lobed . . . Cullenia, i. 162.
        Tube of perianth of 4 linear, cohering segments . . cxiv. Proteaceæ, iii. 456.
      Perianth-tube short or 0.
        Ov. of 2 or more free carpels.
          Carpels 1-ovuled.
            Stam. hypogynous.
              Carpels coriaceous i. Ranunculaceæ, i. 1.
              Carpels membranous Gisekia, ii. 273.
            Stam. perigynous, l. pinnate . . Poterium, ii. 140.
          Carpels many-ovuled Sterculia, i. 163.
        Ov. 1-celled, ovules many, parietal.
          Stam. hypogynous . xi. Bixaceæ, i. 69.
          Stam. perigynous . lvi. Samydaceæ, ii. 236.
        Ov. 1-celled, 1-ovuled.
          L. simple.
            Stam. opp. perianth lobes.
              Embryo annular in floury endosp. ciii. Amaranthaceæ, iii. 392.
              Embryo straight in fleshy endosp. Cansjera, i. 259.
            Stam. not opp. perianth lobes.
              L. exstipulate.
                Stam. 1–5, embryo annular . civ. Chenopodiaceæ, iii. 406.
                Stam. many, cotyled. plano-convex Calophyllum, i. 98.
              L. stipulate.
                Styles 2 or 3 . cv. Polygonaceæ, iii. 410.
                Style 1 . Alchemilla, ii. 140.
          L. pinnate . . Poterium, ii. 140.
        Ov. 1–5-celled, cells few- or many-ovuled.

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|---|---|
| L. pinnate, ov. 1-celled, trees . | XLIV. LEGUMINOSÆ, ii. 4. |
| L. pinnatifid, ov. 2-celled, herbs . | VIII. CRUCIFERÆ, i. 52. |
| L. simple. | |
| Ov. 1-celled, few-ovuled . . | CIII. AMARANTHACEÆ, iii. 392. |
| Ov. 1-celled, many-ovuled . . | AMMANNIA, ii. 223. |
| Ov. 2–5-celled . | LXII. FICOIDEÆ, ii. 267. |
| Ov. 3-celled, cells 1-ovuled. | |
| L. simple . . | XXXVIII. RHAMNACEÆ, i. 278. |
| L. pinnate . . | SCHLEICHERA, i. 304. |
| Ov. many-celled, cells many-ovuled . | SONNERATIA, ii. 229. |
| Fl. unisexual. | |
| Leafless fleshy root-parasites . . . | CXIX. BALANOPHORACEÆ, iii. 476. |
| Stem. leafy. | |
| Submerged aquatic, l. dissected . . | CXXII. CERATOPHYLLACEÆ, iv. 120. |
| Terrestrial herbs, shrubs or trees. | |
| Ov. of 3–5 separate carpels. | |
| Climbing shrub, sep. 6 | ANAMIRTA, i. 40. |
| Trees, perianth 5-lobed . . | XXIII. STERCULIACEÆ, i. 163. |
| Ov. a 1-celled 1-ovuled carpel. | |
| Anth. dehiscing by valves . . | CXIII. LAURACEÆ, iii. 437. |
| Anth. dehiscing by slits. | |
| L. stipulate . . | CXXI. URTICACEÆ, iv. 78. |
| L. exstipulate. | |
| L. alt., fr. 2-valved, trees | XII. MYRISTICACEÆ, iii. 433. |
| L. opp., fr. indehisc., herb | ATRIPLEX, iii. 406. |
| Ov. 1-celled, ovules few or many, parietal | XI. BIXACEÆ, i. 69. |
| Ov. 1-celled, 2-ovuled, scandent shrub . | PYRENACANTHA, i. 263. |
| Ov. 2-more-celled, cells 1–3-ovuled. | |
| Seeds with endosp. . | CXXV. EUPHORBIACEÆ, iv. 1. |
| Seeds without endosp. | XL. SAPINDACEÆ, i. 298. |

SERIES VI.—**Achlamydeæ.** Perianth 0 in the male fl. or fem. fl., or in both.

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|---|---|
| Perianth 0 in fl. of both sexes. | |
| Infl. of many-pedicelled stam. and 1-pedicelled 3-celled ov., all surrounded by a perianth-like campanulate involucre . . . | EUPHORBIA, iv. 3. |

Fl. solitary, bisexual, stam. 1 or 2, aquatic herb . . . . . . . PODOSTEMON, iii. 416.
Fl. solitary, unisexual, stam. 1, aquatic herb . . . . . . . CALLITRICHE, ii. 149.
Fl. minute spicate.
Fl. bisexual, styles 2–4 . . . CIX. PIPERACEÆ, iii. 209.
Fl. binate, a male and a fem. connate CX. CHLORANTHACEÆ, iii. 432.

Perianth 0 in fem. fl. only of the following genera:—
HALORAGEÆ; Serpicula, ii. 147; Myriophyllum, ii. 148.
COMPOSITÆ; Xanthium, iii. 35.
BALANOPHORACEÆ, iii. 476.
URTICACEÆ; Ficus, iv. 83; Antiaris, iv. 96; obscure in Dorstenia, iv. 10.

## CLASS II.—GYMNOSPERMS.

CXXIII. CYCADEÆ, L. iv. 121.

## CLASS III.—MONOCOTYLEDONS.

SERIES I.—**Petaloid.** Perianth usually double, of 6 segments in two rows, rarely single.

A. Perianth superior.
Submerged herbs, fresh water and marine . . . CXXIV. HYDROCHARIDEÆ, iv. 122.
Terrestrial herbs.
Stam. 6.
Fl. regular.
L. undivided.
Anth. with the connective appendaged.
Cells of ov. many-ovuled CXXV. BURMANNIACEÆ, iv. 129.
Cells of ov. 2-ovuled . TRICHOPUS, iv. 279.
Anth. with connective not appendaged.
Cells of ov. 2-ovuled . CXXVIII. HÆMODORACEÆ, iv. 266.
Cells of ov. many-ovuled CXXIX. AMARYLLIDEÆ, iv. 268.
L. tripartite, segments laciniate CXXX. TACCACEÆ, iv. 273.
Stam. 2. . . . . . . APOSTASIA, iv. 238.
Fl. irregular.
Stam. adnate to the style . CXXVI. ORCHIDEÆ, iv. 132.
Stam free from the style . CXXVII. SCITAMINEÆ, iv. 238.
B. Perianth inferior.
Fl. very minute in dense involucrate heads . . . CLXVII. ERIOCAULONEÆ, v. 1.
Fl. on a spadix.
Spadix at first enclosed in one or more spathes.
Spadix branched, shrubs or trees . . . CXXXIX. PALMEÆ, iv. 319.
Spadix simple, perianth single.
Spathe open.
Herbs, fl. unisexual . ORONTIEÆ. iv. 344.
Climbing shrub, fl. bisexual POTHOS, iv. 363.
Spathe calyptriform, caducous, aquatics . APONOGETON, iv. 372.
Spathe 0, or very imperfect, aquatics.

Fl. bisexual.
Perianth segm. 4, carpels 4 — POTAMOGETON, iv. 373.
Perianth segm, 6, ov. 2-3 celled — ACORUS, iv. 365.
Fl. monœcious, per. (?) of fine hairs . . . CXLI. TYPHACEÆ, iv. 342.
Fl. not on a spadix.
Ov. of many separate carpels.
Leafy aquatics, cal. green, cor. white . . . CXLV. ALISMACEÆ, iv. 369.
Leafless saprophytes, perianth 4–8-partite . CXLIV. TRIURIDEÆ, iv. 367.
Ov. syncarpous, perianth 6-partite, except *Dracæna.*
Stam. 4, stem twining l. broad . . . CXXXII. ROXBURGHIACEÆ, iv. 280.
Stam. 3–2.
Rush-like plants, fl. in cone-like spikes . CXXXV. XYRIDEÆ, iv. 296.
Stam. alternating with staminodes . . CXXXVI. COMMELINACEÆ, iv. 298.
Stam. 6.
Fl. unisexual, fr. baccate.
Climbing shrubs, l. 3–9-veined . . — SMILAX, iv. 282.
Erect, tall herbs, l. closely veined . — SUSUM, iv. 317.
Fl. bisexual.
Fr. capsular.
Fl. irregular . . — FLOSCOPA, iv. 315.
Fl. regular.
Fil. naked.
Perianth membranous . CXXXIII. LILIACEÆ, iv. 281.
Perianth coriaceous . . CXXXVIII. JUNCACEÆ, iv. 318.
Fil. long-bearded — CYANOTIS, iv. 311.
Fr. baccate.
L. tipped by a spiral tendril . FLAGELLARIA, iv. 317.
L. replaced by eladodes . . ASPARAGUS, iv. 284.
Stem erect, woody, fl. panicled DRACÆNA, iv. 287.
L. ovate, fl. subumbellate . DISPORUM, iv. 288.
L. linear, fil. swollen in the middle . . . . DIANELLA, iv. 288.

SERIES II.—**Apetaloid.** Perianth o or very obscure; fl. not in spikes of imbricating bracts.

Small or minute, floating, gregarious disks . . . . . . CXLIII. LEMNACEÆ, iv. 366.
Stemless floating herb, l. arranged in a cup . . . . . . — PISTIA, iv. 344.
Fl. in a spadix, usually crowded, 2 only in *Ruppia.*
Spadix enclosed at first in a spathe or spathes.
Spathe solitary.

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|---|---|
| Erect, unisexual herbs . . | CLXII. ARACEÆ, iv. 343. |
| Scandent, bisexual shrubs . | RHAPHIDOPHORA, iv. 361. |
| Submerged aquatic herb, spathe hyaline . . . . | RUPPIA, iv. 374. |
| Spathes several, scandent shrubs, fl. unisexual. . . . | CXL. PANDANACEÆ, iv. 338. |
| Spadices naked, monœcious, fl. immersed in hairs . . . | CXLI. TYPHACEÆ, iv. 342. |
| Submerged aquatics, fl. axillary, unisexual. | |
| Fl. solitary, carpel 1, fresh or brackish water . . . | NAIAS, iv. 375. |
| Fl. solitary or cymose, carpels 2, salt water . . . . | CYMODOCEA, iv. 376. |

SERIES III.—**Glumal.** Fl. small or minute, solitary, sessile in the bracts (glumes) of spikes; perianth 0, or of usually very minute scales or of bristles; stam. 1–3, very rarely more; ov. 1-celled, 1-ovuled. Sedges and grasses.

| | |
|---|---|
| Stem trigonous or terete, l.-sheaths usually closed, anth. basifixed, embryo in the base of floury endosperm . . . . . | CXLVIII. CYPERACEÆ, v. 12. |
| Stem terete or compressed. l.-sheaths usually split to the base, anth. dorsifixed versatile, embryo on the side of floury endosperm . | CXLIX. GRAMINEÆ, v. 113. |

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## B.

## *Diagnostic Characters of the Orders to which the Flowering Plants of Ceylon belong, in the sequence* adopted by Dr. Trimen in this Hand-book.*

### CLASS I.—DICOTYLEDONS.

### A. POLYPETALOUS (Orders I–LXV.)

SERIES I.—**Thalamifloral.**—Fl. mostly regular and bisexual; cal. inf., of distinct sep. or partite. Pet. distinct or united at the very base only, hypog. Torus rarely expanded into a disk. Stam. hypog. Ov. sup. (inf. in *Ancistrocladeæ*), immersed in the torus in *Nymphæaceæ*.

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* The sequence is that of Bentham and Hooker's 'Genera Plantarum.' As stated by Dr. Trimen in Part I., Introd. p. 1, 'only such characters are given as are shown by the species found in Ceylon.

§ 1. Ov. apocarp. Fl. regular, bisexual, except in *Menispermaceæ*. See also *Malvaceæ*.

I. Ranunculaceæ. — Sep. deciduous, often coloured. Pet. 5, or many, or 0. Stam. indef. Carp. many, 1-ovuled. Seeds without an aril; endosp. copious.—Climbing shrubs, with opp. l., or herbs with alt. l.; stip. 0. i. 1.

II. Dilleniaceæ.—Sep. 5, deciduous, imbric. Pet. 4–5. Stam. indef., distinct or in bundles. Carp. few or many, few- or many-ovuled. Seeds arillate (except *Dillenia*); endosp. fleshy.—Trees, shrubs, or herbs; l. alt. or radical, simple or pinnatisect. i. 5.

III. Magnoliaceæ.—Sep. and pet. not distinguished, 9–12, imbricate in several series. Stam. indef., distinct or combined. Carp. indef., imbricate, each 2-4-ovuled. Fr. of follicles; endosp. copious.—Trees or climbing shrubs; l. alt., simple, entire, stipulate. i. 14.

IV. Anonaceæ.—Sep. 3, sometimes connate, usually valvate. Pet. 6. biseriate, distinct, or inner connate. Stam. def. or indef., connective prolonged. Carp. many, few, or 1, 1-many-ovuled. Seeds large; endosp. ruminate.—Trees or shrubs; l alt., simple, entire; stip. 0. i. 16.

V. Menispermaceæ.—Fl. diœcious. Sep. and pet. 6 each, rarely 5, 4, 1. Male fl.:—Stam. 6, biseriate, opp. pet.; fem. fl.:—staminodes 6 or 0. Carp. 3-6 (or 12 or 1), 1-ovuled; style lat. or basal. Fr. of drupes. Seed hooked; cotyled. narrow, flat.—Twining shrubs or herbs; l. alt., simple, entire; stip. 0. i. 37.

VI. Berberideæ.—Sep. and pet. 6 each, biseriate, imbricate. Stam. 6, opp. pet., anth. opening by valves. Carp. 1, few-ovuled. Fr. fleshy; endosp. copious, cotyled. flat.—Shrubs; l. simple, or represented by 3-partite spines. i. 48.

VII. Nymphæaceæ.—Sep. 4–5, distinct. Pet. many, many-seriate, imbricate. Stam. very many. Carp. many, in pits of the torus, or confluent with the torus in a many-celled ov., cells 1- or more-ovuled. Fr. a spongy berry, or of nuts in the pits of a turbinate torus.—Aquatic herbs; l. large, simple, peltate. i. 49.

§ 2. Ov. syncarp., 1-celled or 2-celled in *Polygalaceæ*, placent. pariet., sometimes meeting and forming a 2- or more-celled fr. See also *Ternstrœmiaceæ*.

VIII. Cruciferæ.—Sep. 4, imbricate. Pet. 4 or 0. Stam. 6, 4, 2, if 6, 4 inner longest, in pairs. Ov. 2-celled by a membrane from the placent.; ovules few or many. Fr. a 2-valved pod. Endosp. 0; cotyled. flattened, radical up-curved.—Herbs; l. alt.; stip. 0. i. 52.

IX.—Capparideæ.—Sep. 4, pet. 4 or 2. Stam. 4, 6, or indef., on the base or sides of the torus. Disk hornlike in *Cadaba*. Ov. 1-celled, usually elevated on the torus, placent. 4-6. Fr. capsular or indehisc. Embryo curved; endosperm 0.—Trees, herbs, or shrubs; l. alt., simple or compound. i. 54.

X. Violaceæ.—Fl. regular or not. Sep. 5, imbricate, persistent. Pet. 5, equal or unequal. Stam. 5, anth. of 2 spurred. Disk in *Alsodeia*. Ov. 1-celled; placent. 3, few- or many-ovuled. Caps. 3-valved.—Herbs, shrubs, or trees; l. alt., stipulate. i. 65.

XI. Bixaceæ.—Fl. uni- or bi-sexual. Sep. 4–8. Pet. 4–6 or 0, imbric. or contort. Ov. 1-celled, placent. 3–7, sometimes meeting, 1- or

more-ovuled. Fr. a berry, rarely 3-valved; cotyled. foliaceous; endosp. oily. i. 69.

XII. PITTOSPORACEÆ.—Sep. and pet. 5 each, imbricate. Pet. connate at very base. Stam. 5, distinct. Ov. 1-celled, placent. 2, often meeting, few- or many-ovuled. Caps. 2-valved; embryo small; endosp. copious.—Trees or shrub; l. alt.; stip. o. i. 77.

XIII. POLYGALACEÆ.—Fl. irreg. Sep. 5, unequal, imbric. Pet. 3 or 5, free or connate below with fil. Stam. 4, 5, 8, distinct or connate; anth. opening by pores. Ov. 1–2-celled; cells 1–few-ovuled. Fr. indehisc., 1-seeded, or a 2-celled, 2-seeded caps.—Herbs, shrubs, or trees; l. alt., simple, entire; stip. o. i. 78.

§ 3. Ov. syncarpous, 1-celled, ovules on a free central or basal placent.

XIV. CARYOPHYLLACEÆ.—Sep. 5, persist. Pet. 5. Stam. 2–5 or 10. Styles 3–5. Caps. 3–5-valved; embryo curved round mealy endosp.—Herbs, l. opp.; simple; stip. o. i. 84.

XV. PORTULACACEÆ.—Sep. 2, connate below. Pet. 4 or 5, perigyn. Stam. 4–16, perigyn. Ov. $\frac{1}{2}$-inf. Caps. circumsciss.; embryo curved round mealy endosp.—Herbs or undershrubs; l. alt. or opp.; stip. o. i. 88.

XVI. TAMARISCINEÆ. — Sep. and pet. 5, imbric. Stam. 5. Ov. 1-celled, ovules many, on 3 basal placent.; styles 3. Caps. 3-valved. Seeds with a pencil of long hairs.—Trees; l. scale-like; stip. o. i. 91.

§ 4. Ov. syncarpous, 1–many-celled; placent. axile or basal.

XVII. ELATINEÆ.—Sep. and pet. 3–5 each, distinct, imbric. Stam. 3 or 10. Ov. 3–5-celled; cells many-ovuled; placent. axile. Caps. septicidally 3–5-valved.—Annual herbs; l. opp., stipulate. i. 92.

XVIII. HYPERICACEÆ.—Sep. and pet. 5 each, distinct. Stam. indef. in 1 or in 5 bundles. Ov. 1-celled, placent. 3, pariet., or 3-celled, placent. axile. Caps. septicidal, many-seeded.—Herbs or shrubs; l. opp., entire; stip. o. i. 93.

XIX. GUTTIFERÆ.—Fl. uni- or bi-sexual. Sep. 4–5, imbric., persist. Pet. 4–8, much imbric., or o. Stam. indef.. distinct or fil. connate. Ov. 1–many-celled; ovules in each cell 1–4, axile. Fr. indehisc., rarely 2-valved. Seed large, fleshy.—Trees; l. opp., entire; stip. o. i. 94.

XX. TERNSTRŒMIACEÆ.—Fl. bisex. or diœc. Sep. 3–5, distinct, often unequal. Pet. 5, free or bases connate. Stam. few or many, free or adnate to base of pet. Ov. 2–5-celled; cells few- or many-ovuled, or 1-celled and placent. pariet., styles 2–5, or stigma sessile.—Trees or shrubs; l. alt., simple; stip. o. i. 107.

XXI. DIPTEROCARPACEÆ.—Sep. 5, free or connate, persist., often accrescent and winged. Pet. 5, free or bases connate, contort. Stam. 5, 10, 15, or indef.; fil. very short; connective often elongate. Ov. 2-3-celled, cells with 2 pendulous ovules. Fr. enclosed in the often accrescent and winged cal. Seed large; endosp. o.—Trees; l. alt., simple, entire, stipulate. i. 112.

XXI. bis. ANCISTROCLADEÆ.—Cal. sup., limb unequally 5-fid, accrescent. Pet. 5, bases connate. Stam. 5, adnate to bases of pet. Ov. 1-celled, ovule 1, erect; style 3-fid. Fr. indehisc.; endosp. ruminate.—Climbing shrub; l. alt., entire; stip. o. i. 138.

XXII. MALVACEÆ.—Cal. valvate. Pet. 5, usually connate at base and with fil., rarely o. Stam. indef., fil. usually connate in a long tube, anth. 1-celled. Ov. 2–many-celled, ovules axile in the cells. Fr. syn- or apo-carp.; embryo curved.—Trees, shrubs, or herbs; l. alt., stipulate (except *Cullenia*). i. 140.

XXIII. STERCULIACEÆ.—Fl. uni- or bi-sex., regular or not. Cal. 5-lobed or -partite. Pet. 5, connate below, or o. Stam. 5–20; fil. more or less connate; anth. 2-celled. Carp. 2–5, free or connate in a 1–5-celled ov., cells 1–many-ovuled; styles free or connate. Fr. of follicles, or a loculicidal caps., or indehisc.—Trees, shrubs, or herbs; l. alt., simple or comp., stipulate. i. 163.

XXIV. TILIACEÆ.—Sep. 5, distinct or connate. Pet. 5, distinct. Stam. many, free. Disk fleshy or o. Ov. 2–5-celled; cells 2–many-ovuled, style simple. Fr. a loculicidal caps., or a drupe. Cotyled. flat; endosp. fleshy.—Trees, shrubs, or herbs; l. alt., simple, stipulate. i. 171.

SERIES II. **Disciflorai.**—Sep. distinct or connate, very rarely sup. Pet. distinct or connate at the very base. Torus generally expanded into a pulvinate or cupular disk between the pet. and ov., rarely of glands, or o.

§ 1. Ovules pendulous, raphe ventral.

XXV. LINACEÆ.—Sep. and pet. 5 each, distinct or connate. Pet. imbric. or contort. Disk of glands, or obscure. Stam. 5 or 10; fil. more or less connate. Ov. 3- or 5-celled; cells 1–2-ovuled; styles 3 or 5. Fr. a caps. or drupe. Embryo flat, endosp. scanty.—Herbs, shrubs, or trees; l. alt., simple. i. 188.

XXVI. MALPIGHIACEÆ.—Fl. irreg. Sep. 5, bases connate; one with a large gland externally. Pet. 5, distinct, clawed, imbric. Disk obscure. Stam. 10, declinate, 1 longest. Ov. 3-celled; cells 1-ovuled. Fr. of 1–3 winged nuts.—Climbing shrubs; l. opp., entire; stip. o. i. 192.

XXVII. ZYGOPHYLLACEÆ.—Sep. and pet. 5 each, distinct, imbric. Stam. 10, 5 opp. pet. longest. Disk 10-lobed. Ov. 5-celled; cells several-ovuled; style 1. Fr. of indehisc. cocci. Embryo green, endosp. o.—Herbs; l. opp., pinnate, stipulate. i. 194.

XXVIII. GERANIACEÆ. — Fl. regular or not. Sep. 5 or 3, distinct, imbric., one often spurred or saccate. Pet. 5, often very unequal. Disk of 5 glands or o. Stam. 5 or 10. Ov. 5-celled; cells few- or many-ovuled. Fr. of 5 1-seeded cocci, or a caps. or drupe.—Herbs, rarely shrubby; l. alt. or opp., simple or compound. i. 195.

XXIX. RUTACEÆ.—Fl. rarely unisex. Sep. 4–5, imbric. Pet. 4–5, distinct, imbric., or valvate. Disk large or small. Stam. 4–12. Ov. 2–7-celled; cells 1- 2- or many-ovuled; styles free or connate. Fr. various.—Trees or shrubs; l. simple or comp., punctate with pellucid glands. i. 213.

XXX. SIMARUBACEÆ.—Fl. uni- or bi-sex. Sep. and pet. 4 or 5 each, imbric. or valvate. Stam. 5, 8, 10, distinct. Disk annular or inconspicuous. Ov. 2–5-lobed or apocarp., 1–2-ovuled. Fr. of 1–5 free, 1-seeded, indehisc. carpels.—Trees or shrubs; l. alt., simple or pinnate; stip. o. i. 229.

XXXI. OCHNACEÆ.—Sep. 5, persist. Pet. 5, imbricate. Stam. 10

or indef. Disk tumid. Carp. 3–10, free, 1-ovuled. Fr. of 3–8, indehisc. carp.—Trees or shrubs; l. alt., simple, stipulate. i. 232.

XXXII. BURSERACEÆ.—Fl. uni- or bi-sex. Cal. 3–5-fid, or of 3–5 pet., valvate or imbric. Stam. 4–10. Disk fleshy, annular, lining cal.-tube or o. Ov. 2–3-celled; cells 1-2-ovuled. Fr. a 1-3-celled drupe, epicarp sometimes 2-valved. Cotyled. crumpled or folded, endosp. o.—Trees; l. alt., compound. i. 235.

XXXIII. MELIACEÆ.—Fl. uni- or bi-sex. Cal. 4–5-fid, or sep. 5 distinct. Pet. 3–5, imbric. or valvate. Stam. 6–10; fil. usually connate in a tube, rarely free. Disk annular, obscure, or o. Ov. 2–5-celled, cells 2- or more-ovuled; style simple. Fr. a caps., drupe, berry, or membranous.—Trees, rarely shrubs; l. alt., comp. i. 241.

XXXIV. CHAILLETIACEÆ.—Fl. polygam. Sep. 5, unequal, imbric. Pet. 5, distinct, 2-lobed. Disk of scales at base of pet. Stam. 5. Ov. 2-celled; styles 5. Fr. a 2-valved drupe with 2-seeded stone. Cotyled. thick; endosp. o.—Trees or shrubs; l. alt., simple; stip. persist. i. 253.

§ 2. Ovules pendulous, raphe dorsal.

XXXV. OLACINEÆ.—Fl. uni- or bi-sex. Cal. inf. or sup., 4–5-lobed or o. Pet. 4–5, distinct or cohering in a tube, valvate or imbric. Disk annular or cupular, perig. or epig. Stam. 3–10. Ov. 1–5-celled; cells 1–2-ovuled. Drupe 1-celled, 1-seeded. Endosp. copious.—Trees or shrubs; l. alt., simple; stip. o. i. 254.

XXXVI. ILICINEÆ.—Fl. diœcious. Cal. 4–5-fid, imbric. Cor. 4–5-lobed or -partite. Stam. 4–5, hypog. or on base of corolla. Disk o. Ov. 3–6-celled; cells 1-ovuled; stigma large, sessile. Drupe with 4–6 stones. Endosp. fleshy.—Trees; l. alt., simple; stip. o. i. 264.

§ 3. Ovules erect, raphe ventral.

XXXVII. CELASTRACEÆ.—Fl. rarely unisex. Cal. 4-5-lobed, persist. Pet. 4–6, imbric. or contort. Disk large. Stam. 2–5. Ov. free or immersed in disk, 2–5-celled; cells 1- or 2-ovuled; style 2–3-fid. Fr. a loculicidal caps. or a drupe or berry, or apocarp. Cotyled. flat.—Trees or shrubs; l. simple. i. 266.

XXXVIII. RHAMNACEÆ.—Cal. rarely sup., 5-fid, lobes valvate. Pet. small, 5, or o. Disk lining the cal.-tube. Stam. 5, opp. the pet. Ov. 2–4-celled; cells 1-ovuled; style 2–4-fid. Fr. a caps., or of 3 distinct carp.—Shrubs or trees; l. stipulate. i. 278.

XXXIX. AMPELIDEÆ.—Cal. cupular, entire or 3–5-lobed. Pet. 4–5, distinct or connate, valvate. Disk large, cupular or annular. Ov. 2-celled, cells 2-ovuled, or 6-celled, cells 1-ovuled. Fr. a berry.—Shrubs or herbs; usually climbing; l. alt., stipulate. i. 286.

§ 4. Ovules ascending, or pendulous from an erect funicle, raphe ventral or reversed.

XL. SAPINDACEÆ.—Fl. usually unisex. and irregular. Sep. 4-5, or a 4–6-lobed valvate calyx. Pet. 4–5, distinct. Disk annular or unilat. Stam. 5, 8, 10, fil. distinct. Ov. 2- or 3-celled; cells 1–2-ovuled. Fr. indehisc. or capsular, or of 1–3 indehisc. carp.—Trees, shrubs, or herbs; l. alt. or opp., simple or compound. i. 298.

XLI. SABIACEÆ.—Fl. irreg. Sep. and bracteoles together 5–13. Pet. 5, unequal, 3 orbicular, concave, 2 much smaller, bifid. Disk cupular, 3–8-toothed. Stam. 5, 2 fertile, opp. and adnate to smaller pet.,

3 imperfect. Ov. 2-celled; cells with 2 superposed ovules; style short, conical. Drupe oblique, 1-celled, 1-seeded.—L. alt., simple or pinnate; stip. o. i. 314.

XLII. ANACARDIACEÆ.—Fl. uni- or bi-sex. Cal. 3–5-fid or -partite. Pet. 3–5, imbric. or valvate. Stam. 4–10. Disk annular. Ov. 1- or 5-celled, or of 5 distinct 1-ovuled carpels; style 2–3-fid. Drupe with a 1–5-celled stone. Embryo large; endosp. o.—Trees or shrubs; l. alt., simple or compound; stip. o. i. 316.

SERIES III. **Calycifloral.** — Fl. regular or irregular, uni- or bi-sex. Cal. sup. or inf. Pet. distinct or united at the base, perig. Disk rarely present Stam. perig. or epig. (hypog. in *Droseraceæ*).

§ 1. Ov. superior, of one or more free or connate carpels; inferior in some *Rosaceæ* and *Halorageæ;* styles usually as many as carpels.

XLIII. CONNARACEÆ.—Cal. 5-fid or -partite, imbric. or valvate. Pet. 5, narrow. Stam. 5 or 10. Carp. 1–5; cells 2-ovuled; ovules collateral. Fr. of 1 or 2 follicles. Seed large, erect, arillate; endosp. o.—Shrubs or trees, often scandent; l. alt., imparipinnate or unifoliolate. ii. 1.

XLIV. LEGUMINOSÆ.—Fl. regular or not, rarely unisex. Cal. 5-lobed or -partite or 5-sepalous, often 2-lipped. Pet. 5 or fewer, rarely o or connate, usually very unequal (papilionaceous). Stam. 10, diadelph. and declinate, or numerous, rarely all distinct. Ov. 1-celled; ovules 1 or more, on the ventral suture. Fr. a dehisc. or indehisc. 1–many-seeded pod, rarely a drupe. Cotyled. large; endosp. o.—Herbs, trees, or shrubs, often climbing; l. alt., usually comp., stipulate; lflts. entire. ii. 4.

XLV. ROSACEÆ.—Cal. inf. or sup., 4–6-cleft. Pet. 4–6 or o. Stam. def. or indef., distinct. Ov. of 1, few, or many, 1–2-ovuled, carps. (2-celled in *Photinia*). Fr. various. Cotyled. plano-convex; endosp. o.—Herbs, shrubs, or trees; l. alt., simple or comp., stipulate. ii. 134.

XLVI. SAXIFRAGACEÆ.—Cal. sup., limb 5-partite. Pet. 5. Disk epig. Ov. 1-celled; ovules many, on 2 pendulous placent.; styles 2–3. Seeds very minute.—Herb; l. opp.; stip. o. ii. 143.

XLVII. CRASSULACEÆ.—Sep. 4. Cor.-tube inflated, lobes 4, spreading. Stam. 8, biseriate on the cor.-tube. Disk-glands 4, hypog. Ov. of 4 distinct, many-ovuled carp. Fr. of 4 many-seeded follicles.—Herb; l. opp., succulent; stip. o. ii. 143.

XLVIII. DROSERACEÆ.—Sep. and pet. 5 each, both persist. Stam. 5, hypog. Ov. 1-celled, ovules many on 3–5 pariet. placent.; styles 3 or 5. Caps. loculicidally 3–5-valved. Seeds minute, reticulate.—Herbs clothed with glandular hairs. ii. 145.

XLIX. HALORAGEÆ.—Fl. unisex.; male fl.:—cal. 4-fid or o; stam. 1, 4, 8; fem. fl.:—cal. sup., limb 4-cleft or o; pet. o; ov. 1–2- or 4-celled, ovules solitary, pendulous; styles or stigmas 2 or 4. Fr. 4-lobed or of 2 or 4 carp.—Herbs, usually aquatic or marsh; l. opp., alt., or whorled, simple or pinnatifid. ii. 147.

§ 2. Ov. inf., or included in the cal.-tube, syncarpous, style undivided; cells 2- or more-ovuled.

L. RHIZOPHORACEÆ.—Cal. sup. or $\frac{1}{2}$-sup., rarely inf., segm. 4–5 or 8–14, valvate. Pet. as many as cal.-segm., often cleft. Stam. twice as many as pet. Disk annular or o. Ov. 2–4-celled, ovules 1–2, pendulous

in each cell. Fr. indehisc., 1-seeded, or dehisc., 4–6-seeded.—Trees or shrubs; l. opp., stipulate, rarely alt. and exstip. ii. 150.

LI. COMBRETACEÆ.—Fl. uni- or bi-sex. Cal. sup., limb tubular, 2- or 4–7-lobed. Pet. 4, 5, or 0. Stam. 4–10; staminodes as many, or 0. Ov. 1-celled; ovules 1–5, pendulous. Fr. indehisc., 1-seeded. Cotyled. large, plaited or convolute.—Trees or shrubs; l. exstip. ii. 158.

LII. MYRTACEÆ.—Cal. sup.; limb short, 2–5-lobed. Pet. 4 or 5, distinct, or bases connate, or united in a cap. Stam. indef., epig. Ov. 2–4-celled; cells many-ovuled; style simple. Fr. indehisc., 1–many-seeded. Endosp. 0.—Trees or shrubs; l. simple, often gland-dotted; stip. 0, or minute. ii. 165.

LIII. MELASTOMACEÆ.—Cal. sup. or inf., tube more or less elongate, 3–5-lobed. Pet. 3–5, contort. in bud. Stam. 3, 8, 10, on cal.-tube; anth. opening by 1 or 2 pores or slits, base often spurred. Ov. 1- or 3–5-celled, placent. axile or free central; style simple. Fr. a caps. or indehisc., 1- or many-seeded.—Trees, herbs, or shrubs; l. opp. exstip. ii. 192.

LIV. LYTHRACEÆ.—Cal. inf., rarely sup., 3–6-lobed, valvate, persist. Pet. 3–6 or 0, crumpled. Stam. 3, 6, 12, or indef., on the cal.-tube. Ov. 1–6-celled; cells 1- or many-ovuled; style simple. Caps. many-seeded.—Trees, shrubs, or herbs; l. opp., entire, exstip. ii. 222.

LV. ONAGRACEÆ.—Cal. sup. or $\frac{1}{2}$-sup., segm. 4–5, valvate. Pet. 4–5, contort. Stam. 8 or 10, epig. Ov. 4–5-celled; cells many-ovuled; style short. Caps. irregularly dehisc., very many-seeded.—Herbs; l. alt., entire (except submerged of *Trapa*). ii. 232.

§ 3. Ov. inf. or sup., syncarpous, 1-celled, or 3-celled by fusion of placentas; styles distinct, or connate below.

LVI. SAMYDACEÆ.—Cal. inf. or $\frac{1}{2}$-inf., segm. 4–5. Pet. 4, 5, or 0. Stam. 4–10, perig., free or connate with staminodes. Disk annular, or of glands. Ov. 1-celled; ovules few, pariet.; styles 1–4. Caps. soft, loculicidally 2–3-valved. Seeds arillate, endospermous.—Trees or shrubs; l. alt., simple; stip. minute. ii. 236.

LVII. PASSIFLORACEÆ. — Fl. diœcious; male:—cal. campanulate, 5-toothed or cleft, imbric.; pet. 5, distant; disk of cilia and 5 glands opp. cal.-lobes; stam. 5, perig., distinct or connate; fem. fl.:—perianth of male; ov. sup., stipitate; placent. pariet.; stigmas 3, papillose. Caps. loculicidally 3-valved. Seeds flat, arillate.—Herbs with tendrils. ii. 239.

LVIII. CUCURBITACEÆ.—Fl. unisex.; male:—cal.-tube short, 5-fid; pet. 5, usually connate; stam. 3 (rarely 5) on cal.-tube; anth. distinct or connate, cells usually conduplicate; fem. fl.:—cal. sup., limb 5-fid. staminodes 3 or 5; ov. 1-celled, placent. 3, fleshy, often confluent in the centre; stigmas 3; ovules few or many. Fr. fleshy, rarely dehisc.—Herbs, with spiral tendrils; l. alt., simple, lobed, or compound. ii. 242.

LIX. BEGONIACEÆ.—Fl. unisex.; male:—sep. 2, valvate; pet. smaller or 0; stam. indef., usually monadelph; fem. fl.:—sep. and pet. 2–5, sup.; ov. 3-celled; ovules very many on axile placent.; styles 3. Fr. a trigonous thin-walled caps., winged at the angles; seeds many, minute.—Succulent herbs; l. alt., stipulate. ii. 262.

LX. DATISCACEÆ.—Fl. diœcious; male:—sep. 4; pet. 0; stam. 4, opp. sep., inserted on a flat disk; fem. fl.:—cal. sup., limb shortly 4-lobed; pet. 0; ov. 1-celled, placent. 4, pariet., many-ovuled; styles 4, persist.

Caps. small, dehisc. at top; seeds minute.—Tree; l. alt., simple; stip. o.—ii. 265.

§ 4. Ov. inf. or sup., syncarpous, 3–4-celled, with subbasilar placent., or 1-celled with pariet. placent.; styles distinct or connate below; embryo cyclical or excentric.

LXI. CACTACEÆ.—Cal. sup., segm. of limb 4 or 5. Pet. 5 or 6, imbric. Stam. indef., free, inserted at mouth of cal. Ov. 1- or imperfectly 3–4-celled, placent. parietal; style simple, stigma 3-4-lobed. Berry few-seeded.—A succulent, leafless perennial, with cylindric stem and branches. ii. 266.

LXII. FICOIDEÆ.—Sep. 5, inf. or ½-inf. Pet. o, or 5. Stam. def. or indef., perig. or hypog. Ov. 2–5-celled, or of 5 free 1-ovuled carpels; cells few- or many-ovuled. Caps. or carp. thin-walled, loculicidal or circumsciss.; seeds reniform, embryo curved round mealy endosp.—Herbs; l. simple; stip. o. ii. 267.

§ 5. Ov. inf., syncarpous, or of one carpel; ovules 1 in each carp. pendulous.

LXIII.—UMBELLIFERÆ.—Cal. sup., limb 5-fid or o. Pet. 5, often inflexed, free, valvate or imbricate. Stam. 5, and large disk epig. Ov. 2-celled; cells with 1 pendulous ovule; styles 2. Fr. of 2 indehisc. carpels, at length pendulous from an axis, each with 5 ridges, and often with definite oil-canals.—Herbs; l. alt., simple or compound; fl. umbellate. ii. 274.

LXIV. ARALIACEÆ.—Cal. sup. or ½-sup.; limb small or o. Pet. 5–9, valvate. Stam. 5–9, and disk epig. Ov. 4–9-celled; cells with 1 pendulous ovule; styles 4–9 or stigmas sessile. Fr. a drupe, with compressed pyrenes.—Trees or climbing shrubs; l. alt., compound; stip. adnate to petiole. ii. 281.

LXV. CORNACEÆ.—Cal. sup.; limb 4–5-fid. Pet. 4–10, valvate, Stam. def. or indef., and disk epig. Ov. 1-celled; ovule 1, pendulous; style simple. Fr. a drupe.—Trees or shrubs; l. alt.; stip. o. ii. 285.

## B. GAMOPETALOUS (Orders LXVI.–CI.)

§ 1. Fl. regular or irregular. Cal. sup., rarely 1½ sup. Stam. as many as the cor.-lobes, rarely fewer, epipet. or epig. (See also *Vacciniaceæ* in § 2.)

LXVI. CAPRIFOLIACEÆ.—Cal. sup.; limb 5-lobed. Cor.-lobes 5, equal, imbric. Stam. 5, on the cor.-tube. Ov. 1–3-celled; cells with 1 pendulous ovule; style short. Drupe 1-seeded.—Shrubs or small trees; l. opp.; stip. o. ii. 288.

LXVII. RUBIACEÆ.—Cal. sup., limb usually 4–5-cleft. Cor. from tubular to rotate, 4–9-lobed. Stam. 4–9, on the tube of cor., alt. with its lobes. Ov. 1–10- usually 2-celled; cells 1–2- or many-ovuled; style simple. Disk epig. Fr. a capsule, drupe, or berry, or of distinct cocci, 2–many-seeded; endosp. horny—Herbs, shrubs, or trees; l. opp., stipulate, whorled and exstip. in *Galieæ*. ii. 289.

LXVIII. VALERIANACEÆ.—Cal. sup.; segm. minute, becoming filiform and plumose in fr. Cor. infundib.; lobes 5, imbricate. Stam. 3, on base of cor.-tube; anth. distinct. Ov. 3-celled; one cell alone fertile;

ovule pendulous. Fr. dry, indehisc., crowned with feathery cal.-lobes.—Herbs; l. opp., pinnate; stip. o. iii. 1.

LXIX. Dipsaceæ.—Fl. in dense heads, each involucellate. Cal. sup.; limb cupular, 4-fid. Cor. infundibular; lobes 4, imbric. Stam. 4, on the cor.-tube. Ov. 1-celled; ovule 1, pendulous. Fr. an achene adnate to the spinescent involucel.—Herbs; l. opp., upper pinnatisect; stip. o. iii. 2.

LXX. Compositæ.—Fl. packed in a head on a recept. surrounded by bracts, all subsimilar, or dimorphous, the outer (ray fl.) with ligulate, the inner (disk-fl.) with tubular corol. Cal. sup.: limb of hairs (pappus), or scales, or o. Cor. of ray-fl. with the lobes connate in a strap; of disk-fl. with 4 or 5 valvate spreading lobes. Stam. 5, on cor.-tube; fil. free, anth. connate (fil. connate, anth. free in *Xanthium*). Ov. 1-celled, disk epig.; ovule 1, erect. Fr. an achene with or without a pappus.—Herbs or shrubs, rarely trees; l. rarely opp.; stip. o. iii. 3.

LXXI. Stylidiaceæ.—Fl. irregular. Cal. sup.; limb 5-partite. Cor. unequally 5-lobed. Stam. 2, epig., fil. confluent with the style in a geniculately decurved, elastically recurving column; anth. distinct, sessile on the column. Ov. 2-celled; cells many-ovuled; stigma minute, sessile between the anth. Caps. linear, 2-valved, many-seeded.—Herb; l. radical. iii. 53.

LXXII. Goodenovieæ.—Fl. irregular. Cal. sup.; limb 5-partite or o. Cor. tubular, cleft dorsally to the base and 5-lobed, induplicate-valvate. Stam. 5, epig.; anth. free. Ov. 2-celled, ovule 1 erect in each cell; style simple, stigma girt by a membranous cup. Drupe with a 2-celled stone.—Shrubs; l. alt.; stip. o. iii. 54.

LXXIII. Campanulaceæ.—Fl. regular or not. Cal. sup. or ½-sup.; limb 5-partite. Cor. 5-lobed or 2-lipped and dorsally cleft to the base, lobes valvate. Stam. 5, epig. or on the base of the cor.-tube; anth. distinct or connate. Ov. 2–3-celled, many-ovuled; stigma 2–3-lobed. Caps. many-seeded.—Herbs; l. alt.; stip. o. iii. 55.

§ 2. Fl. regular, bisex. Cal. inf. (sup. in *Vacciniaceæ*, ½ inf. in *Sphenoclea*). Stam. hypog., perig., epig., or epipet., as many or twice as many as the cor.-lobes, or indef. Ov. 1- or more-celled.

LXXIV. Vacciniaceæ.—Cal. sup.; limb 5-partite. Cor. urceolate, shortly 5-lobed. Stam. 10, epig.; anth.-cells tubular above, opening by a pore, also spurred dorsally. Ov. 5-celled, disk epig.; cells few- or many-ovuled. Berry crowned by the cal. limb, falsely 10-celled.—A small tree; l. alt.; stip. o. iii. 61.

LXXV. Ericaceæ.—Cal. inf., 5-partite, sometimes accrescent. Cor. urceolate or campanulate, 5-lobed. Stam. 10, hypog.; anth. opening by pores or slits. Ov. 5- or 10-celled; cells many-ovuled; stigma lobulate. Caps. 5-celled, 5-valved, many-seeded.—Shrubs or trees; l. alt.; stip. o. iii. 62.

LXXVI. Plumbagineæ.—Cal. inf., persist., tubular, 5-partite. Cor. persist., tube long, lobes 5, twisted in bud. Stam. 5, hypog. Ov. 1-celled; ovule pendulous from a basal funicle; style simple, stigmas 5. Caps. circumsciss. at base.—Herbs; l. alt.; stip. o. iii. 64.

LXXVII. Primulaceæ.—Cal. inf., persist., 5-cleft. Cor.-lobes 5, contort. in bud. Stam. 5, on base of cor., opp. its lobes; anth. bases

sagittate. Ov. 1-celled; ovules many on free central placent. Caps. 5-valved.—Herbs; l. opp. or alt.; stip. o. iii. 65.

LXXVIII. Myrsineæ.—Fl. often unisex. Cal. inf. or ½-inf., persist., 4–5-partite. Cor. 4–5-cleft or -partite; segm. imbric. or contort. Stam. 5, on and opp. the cor.-segm. Ov. 1-celled; ovules 1 or more on a free central placent.; style simple. Fr. a berry or follicle, 1- or more-seeded.—Trees or shrubs; l. alt., simple; stip. o. iii. 67.

LXXIX. Sapotaceæ.—Cal. inf., persist., 4–8-partite, imbric., or segm. biseriate, outer series valvate. Cor.-lobes 4–6, or 12, imbric. or twisted, or 18–24 in 2 or 3 series. Stam. 5, 6, 8, 12, on the cor.-tube and opp. its lobes, or twice as many; staminodes, if present, alt. with the stam. Ov. 4–8-celled; cells 1-ovuled; style simple. Berry 1–8-seeded. Testa of seed shining, hilum very large.—Trees or shrubs; l. alt., entire; stip. o. iii. 75.

LXXX. Ebenaceæ.—Fl. unisex. Cal. inf., 3–5-lobed, imbric. or contort., accrescent. Cor. tubular or campanulate; lobes 3–5, contort.; male fl.:—stam. 4–64, on base of cor., fil. distinct or connate in pairs; fem. fl.:—staminodes 4–16 or o; ov. 3–16-celled; cells 1-2-ovuled. Fr. indehisc.; seeds 2–10, large; cotyled. foliaceous; endosp. copious.—Trees; l. alt., or opp., entire; stip. o. iii. 87.

LXXXI. Styraceæ.—Cal. sup., limb small, 5-lobed, imbric. Cor. 5-partite, rarely tubular below, segm. imbric. Stam. many, in severa series on the base of cor.; fil. unequal. Ov. 2–3-celled; ovules 2, pendulous in each cell; style simple. Drupe 1–3-seeded. Endosp. copious. —Trees or shrubs; l. opp.; stip. o. iii. 103.

§ 3. Ov. sup., rarely inf. Stam. as many as, and alt. with cor.-lobes, or fewer. Carp. 2, rarely 1 or 3 (see also CI. *Plantagineæ*).

* *Fl. regular, l. usually opp.*

LXXXII. Oleaceæ.—Fl. rarely unisex. Cal. inf., 4–5-partite. Cor.-tube long or short, limb 4–11-lobed or-partite, imbric. or valvate. Stam. 2, on base of cor. Ov. 2-celled; cells 1-2-ovuled; styles 1 or 2. Fr. of 2 soft carpels or a drupe, 1–2-seeded.—Trees or shrubs; l. opp., simple or pinnate; stip. o. iii. 112.

LXXXIII. Salvadoraceæ.—Fl. regular or subregular, bi- or uni-sex. Cal. inf., 4-partite. Cor. 4-partite or of 4 pet., imbric. Stam. 4, epipet. or hypog. Ov. 1–2-celled; ovules 1–2, erect in each cell. Drupe 1–2-seeded, endosp. o.—Trees or shrubs; l. opp., entire; stip. o. iii. 120.

LXXXIV. Apocynaceæ.—Cal. inf., 5-partite, often with scales or glands within. Cor. rotate, infundib. or salver-shaped; lobes 5–6, contort. Stam. 5, on tube or throat of cor., free or adnate to stigma, pollen granular. Disk annular or o. Carp. 2, distinct, 1- or 2-celled, few- or many-ovuled; style 1, stigma 2-fid. Fr. of 2 dehisc. or indehisc. follicles. Seeds with often a long pencil of hairs at one or both ends.—Trees, shrubs, or herbs; l. opp. or whorled, very rarely alt., entire; stip. o. iii. 122.

LXXXV. Asclepiadeæ.—Cal. inf., 5, imbric. Cor.-tube, with often a ring of scales in the throat; lobes 5, valvate or contort. Stam. 5, on base of cor.; fil. usually connate in a fleshy tube; anth. adnate by a broad connective to the stigma, 2-celled; pollen in 1 or 2 erect or pendulous granular masses in each cell, the masses of contiguous cells of different anth. attached to glands at the angles of the stigma. Carp. 2, distinct,

enclosed in the stam. tube, many-ovuled; styles 2, short, stigma 1, usually 5-angled, adnate to the anth. Follicles 2. Seeds many, crowned with a long pencil of hairs; endosp. copious.—Herbs or undershrubs, often twining; l. opp., entire, rarely 0; stip. 0. iii. 142.

LXXXVI. LOGANIACEÆ.—Cal. inf., or $\frac{1}{2}$-inf.; segm. 4 or 5. Cor.-lobes 4 or 5, valvate or imbric. Stam. 4 or 5, on the cor.-tube; fil. distinct. Ov. 1–2-celled; cells 1–many-ovuled. Fr. indehisc., rarely a caps. Seeds 1, 2, or many; endosp. copious.—Trees, shrubs, or herbs; l. opp. or ternate, entire. iii. 169.

LXXXVII. GENTIANACEÆ.—Cal. inf., persist., 4–7-partite. Cor. rotate, tubular, or campanulate; lobes 4–7, contort., rarely valvate. Stam. 4–7, on the cor.-tube or throat; fil. distinct. Ov. 1-celled with pariet. placent., rarely 2-celled, many-ovuled; style simple, stigmas 2. Fr. a caps., rarely a berry, many-seeded.—Herbs, one gen. aquatic; l. opp., rarely alt., entire; stip. 0. iii. 179.

** *Fl. regular, l. usually alt.*

LXXXVIII. HYDROPHYLLACEÆ.—Cal. inf., 5-partite. Cor. rotate, 5-cleft; lobes imbric. Stam. 5, on the cor.-tube; fil. distinct. Ov. 2-celled; cells many-ovuled; styles 2. Caps. septicidally 2-valved, many-seeded. Seeds minute.—Herb; l. alt.; stip. 0; fl. racemose. iii. 191.

LXXXIX. BORAGINEÆ.—Fl. rarely unisex. Cal. inf., 5–8-cleft, persist. Cor. tubular, funnel-shaped or rotate; lobes 5–8, imbric. Stam. 5–8, on the cor.-tube; fil. distinct. Ov. 2-celled; cells 2-ovuled, or 4-celled, cells 1-ovuled; styles 1 or 2. Fr. a drupe, or of 4 separable achenes.—Trees, shrubs, or herbs; l. rarely opp.; stip. 0; infl. corymbose, often of scorpioid cymes. iii. 192.

XC. CONVOLVULACEÆ.—Cal. inf., persist., 5-partite, or sep. 5, imbricate. Cor. campanulate, infundib. or rotate; lobes 5, plaited and contort. in bud. Stam. 5, on the cor.-tube; fil. free. Disk annular or 0. Ov. 2-celled; cells 2-ovuled, or 4-celled, cells 1-ovuled, or 1-celled and 4-ovuled; style simple or bifid, stigmas usually 2. Fr. dry or fleshy, indehisc. or 2-valved, or circumsciss., 1–4-seeded. Endosp. 0, cotyled. plaited (endosp. and cotyled. 0 in *Cuscuta*).—Herbs or shrubs, often twining; l. alt. (0 in *Cuscuta*), fl. usually cymose. iii. 204.

XCI. SOLANACEÆ.—Cal. inf., often persist. and accresc., 5-cleft. Cor. rotate or funnel-shaped; lobes 5, plaited or valvate in bud. Stam. 5, on the cor.-tube; anth.-cells with pores or slits. Ov. 2-celled, very many-ovuled, placents. large; style and stigma simple. Fr. a berry or caps., many-seeded; embryo curved round fleshy endosp.—Herbs or shrubs; l. alt. or binate; stip. 0; fl. solitary, or in axill. or term. cymes. iii. 230.

*** *Fl. mostly irregular or oblique, dorsal stam. often imperfect or 0; ov.-cells many- rarely 1-ovuled.*

XCII. SCROPHULARIACEÆ.—Fl. irreg. Cal. inf., 5-lobed, or -partite. Cor. 5- or 4-lobed, usually 2-lipped, lobes imbric. Stam. 4, didynamous, or 2 only perfect. Ov. 2-celled; cells many-ovuled; style simple, stigmas 2. Caps. 2-valved, many-seeded. Seeds small, endosp. fleshy.—Herbs; l. usually opp.; stip. 0; fl. racemose or spicate. iii. 239.

XCIII. OROBANCHACEÆ.—Fl. irreg. Cal. inf., 5-partite or spathaceous. Cor.-tube funnel-shaped; lobes 5, imbric., 2 upper exterior. Stam. 4, didynam.; anth. connate in pairs or free, 1-celled, opening by

pores. Ov. 1-celled; placent. 2, large, many-ovuled. Caps. 2-valved; seeds minute.—Herbaceous, scapigerous, root-parasites; l. o; fl. racemose. iii. 260.

XCIV. LENTIBULARIACEÆ. — Fl. irreg. Cal. inf., 2-partite. Cor. 2-lipped, spurred. Stam. 2, on base of cor.; anth.-cells confluent. Ov. 1-celled; ovules many, on free central placent.; style short, stigma bilobed. Caps. 1–2- or 4-valved.—Annual marsh or aquatic herbs; l. whorled or alt. iii. 266.

XCV. GESNERIACEÆ.—Fl. usually irreg. Cal. inf., 5-partite or sep. 5, valvate. Cor. often 2-lipped; lobes 4–5, imbric. Stam. 4, didynam. or equal, or 2, anth. connate or not, cells sometimes confluent. Ov. 1-celled; placent. 2, pariet. many-ovuled., Caps. 2-4-valved, or circumsciss., or indehisc., many-seeded. — Herbs or shrubs; l. alt., opp., or whorled; stip. o. iii. 271.

XCVI. BIGNONIACEÆ.—Fl. irreg. Cal. inf., campanulate or spathaceous. Cor.-tube campanulate or tubular, 5-lobed. Stam. 4, didynam., or 5. Disk annular. Ov. 2-celled by coalescence of 2 pariet. many-ovuled placents. Caps. large, 2-celled, 2-valved, septum thick. Seeds large, winged. Endosp. o. — Trees; l. opp., comp.; fl. racemed or panicled. iii. 280.

XCVII. PEDALIACEÆ.—Fl. irreg. Cal. inf., 5-partite. Cor. ventricose, sub-2-lipped; lobes 5, imbric. in bud. Stam. 4, didynam., or 5. Ov. 1–celled, placent. parietal, or 2–4-celled by confluence of the placents.; ovules 2 or more, superposed; stigmas 2. Fr. indehisc., spinous, or a caps.—Herbs; l. opp. or alt.; fl. axillary, large. iii. 284.

XCVIII. ACANTHACEÆ.—Fl. irreg. Cal. inf., 4–5- or many-partite. Cor. 2-lipped, or upper lip o; lobes imbric. or contort. Stam. 4 or 2; anth. 1–2-celled. Ov. 2-celled; ovules 2-many, superposed in each cell; style usually bifid. Caps. loculicidal; seeds usually compressed and often hairy.—Herbs or shrubs; l. opp., simple; stip. o; infl. various. iii. 286.

**** *Fl. mostly irregular and 2-lipped; dorsal stam. often imperfect or* o. *Ov.-cells* 1-*ovuled, or ovules* 2, *collateral; fr. indehisc.*

XCIX. VERBENACEÆ.—Fl. regular or not. Cal. inf. 2- or 4–5-partite, 2-lipped or not, persist. Cor. 4–5-lobed, 2-lipped or not. Stam. 4, didynam., or 2. Disk present. Ov. 2–4-celled, cells 1–2-ovuled. Fr. a drupe or 2-4-valved caps.—Herbs, shrubs, or trees; l. opp. or 3-nate, simple or comp.; stip. o; fl. capitate, spicate, or cymose. iii. 345.

C. LABIATÆ.—Fl. irreg. Cal. inf., 2-lipped, 5- or 8–10-cleft, persist. Cor. 2-lipped, or upper lip o, rarely regular, 4–5-lobed. Stam. 4, didynam.; anth. 1- or 2-celled. Disk present. Ov. 4-lobed, of two 2-celled carp.; ovules solitary, erect in each cell; style slender, usually bifid. Fr. of 4 small indehisc. nutlets at the base of the cal.—Herbs or undershrubs, often aromatic; stam. usually 4-gonous; l. opp. or whorled; stip. o; infl. cymose, fascicled, or whorled. iii. 364.

*Gamopetalous Order of doubtful affinity.*

CI. PLANTAGINEÆ.—Fl. regular. Cal. inf.; sep. 4, imbric., persist. Cor. scarious, tubular, lobes 4, imbric. Stam. 4, on cor.-tube; fil. long, flexuous. Ov. 2-celled, cells several-ovuled. Caps. circumsciss.; seeds peltate.—Scapigerous perennial herb; l. radical; fl. spicate. iii. 388.

## C. MONOCHLAMYDEOUS (Orders CII.–CXXII.)

Perianth single, lobes or segments 1-seriate, or if 2-seriate both usually calycine, rarely perianth o.

§ 1. Embryo annular, curved, or folded; endosp. mealy or soft.

CII. NYCTAGINEÆ.—Fl. diœcious or bisex. Perianth inf.; segm. 5, coloured, imbric., plaited in bud, tube persist. Stam. 2–10, hypog., exserted. Ov. 1-celled; ovule 1, erect; style slender. Fr. membranous. Cotyled. large, folded round soft endosp.—Herbs or shrubs; l. subopp., entire; stip. o; fl. cymose or umbellate. iii. 389.

CIII. AMARANTACEÆ.—Fl. rarely unisex. Sep. inf., 5, scarious or subherbaceous, imbric., persist. Stam. 1–5, opp. sep.; fil. distinct or connate with interposed staminodes. Ov. 1-celled, ovules 1 or more, funicles basal. Fr. a utricle; seed erect.—Herbs or undershrubs; l. opp. or alt.; stip. o; fl. bracteate and 2-bracteolate. iii. 392.

CIV. CHENOPODIACEÆ.—Fl. uni- or bi-sex. Perianth inf.; segm. 4–5, or o in fem., distinct or connate, imbric., persist. Stam. 1 or 5, hypog. or perig. Ov. 1-celled, 1-ovuled; styles 2–3. Fr. a membranous utricle. Seed vertical or horizontal, endosp. mealy, or scanty, or o.—Herbs or undershrubs; l. alt. or opp., or o; fl. small, axillary. iii. 406.

CV. POLYGONACEÆ.—Fl. rarely unisex. Perianth inf., 4–5-cleft, often col'd., imbric. persist. Stam. 4, 5, 8, perig. Ov. 1-celled; ovule 1, basal; styles 2 or 3. Fr. a trigonous or biconvex nutlet; embryo lateral, endosp. floury—Herbs or undershrubs; l. alt.; stip. sheathing; fl. axillary, spicate, capitulate, or cymose, bracteate. iii. 410.

§ 2. Submerged aquatics.

CVI. PODOSTEMONACEÆ.—Perianth small or o. Stam. 1, 2, 3, hypog.; fil. connate below. Ov. 2–3-celled; ovules many; styles 2 or 3. Caps. septicidally 2–3-valved. Endosp. o.—Herbs attached to rocks in rapid streams; stem fleshy, flattened or broadly dilated and thalloid; fl. solitary, minute. iii. 415.

§ 3. Terrestrial herbs or shrubs; ov. simple or syncarp., many-ovuled.

CVII. NEPENTHACEÆ.—Fl. diœcious. Perianth inf., deeply 4-cleft. Stam. 8, monadelph.; anth. opening extrorsely. Ov. 4-celled; placent. on the septa, many-ovuled; stigma sessile, lobed. Caps. loculicidally 4-valved. Seeds tailed at both ends.—Shrub, climbing by pitcher-bearing tendrils at the tips of the l.; l. alt.; stip. o; fl. panicled. iii. 419.

CVIII. ARISTOLOCHIACEÆ—Fl. regular or not. Perianth sup., 3-cleft, or tubular and 1–2-lipped. Stam. 6–9; anth. sessile round the very short style. Ov. 4–6-celled, many-ovuled. Caps. 4- or 6-valved. Seeds trigonous, furrowed.—Herbs or shrubs; l. alt.; stip. o; fl. axillary. iii. 421.

§ 4. Ov. various, carpels 1-ovuled, solitary, or several apocarp.

CIX. PIPERACEÆ.—Fl. uni- or bi-sex. Perianth o. Stam. 1–3, anth.-cells distinct or confluent. Ov. 1-celled; ovule 1, erect; styles 2-6. Fr. small, globose or subglobose, dry or epicarp succulent. Embryo minute, endosp. hard.—Herbs or shrubs, often climbing; l. alt., opp., or whorled; fl. minute, spicate. iii. 423.

CX. CHLORANTHACEÆ.—Fl. unisex. Perianth o. Stam. 1; anth. large, 2-celled. Ov. 1-celled; ovule pendulous; stigma sessile. Fr. fleshy. Seed pendulous; embryo minute; endosp. fleshy.—Shrubs; l. opp., serrate, petioles connate in a sheath; fl. minute, in connate pairs of a male and fem., spicate. iii. 432.

CXI. MYRISTICACEÆ.—Fl. diœcious. Perianth inf.; lobes 2–3, valvate. Stam. 6–14; fil. connate, anth. distinct or connate. Ov. 1-celled; ovule basal, erect; style very short. Fr. of 2 fleshy or coriaceous valves. Seed large, aril lacerate; embryo minute, in base of hard ruminate endosp.—Trees; l. alt., distichous, entire; stip. o. iii. 433.

CXII. MONIMIACEÆ.—Fl. bisex. Perianth inf.; sep. many, many-seriate, petaloid, imbricate, persist. Stam. 5–9, hypog., 2-seriate, fil. with lat. appendages. Carp. about 9, distinct, 1-ovuled; ovule pendulous; style short. Fr. of fleshy 1-seeded carp. on a tumid torus. Embryo minute; endosp. fleshy.—Shrubs; l. opp., entire; stip. o; fl. racemed or panicled. iii. 436.

§ 5. Ov. sup., 1-celled, 1–2-ovuled. Stam. perig. or epipet. Seeds with distinct testa.

CXIII. LAURACEÆ.—Fl. uni- or bi-sex. Perianth inf. (except *Hernandia*), 6 (3–8), cleft or partite, often persist. Stam. 9 (6–20), (3 in *Hernandia*), 3-seriate, with sometimes a 4th (inner) row of staminodes; fil. flattened, bi-glandular at the base; anth. 2- or 4-celled, opening by valves. Ov. 1-celled; ovule 1, pendulous. Fr. indehisc. Seed pendulous; cotyled. plano-convex, endosp. o.—Trees or shrubs (*Cassytha* a leafless climber); l. opp., alt., or whorled, entire; stip. o; infl. usually panicled. iii. 437.

CXIV. PROTEACEÆ.—Perianth inf.; sep. 4, at first coherent, linear, valvate, deciduous. Stam. 4, on sep.; fil. very short, anth. 2-celled, connective produced. Ov. small, 1-celled; ovules 2, collateral; style very long, stigma clavate. Fr. dry, indehisc. Cotyled. plano-convex, endosp. o. —Trees; l. alt., stip. o; fl. racemed. iii. 456.

CXV. THYMELÆACEÆ.—Perianth inf., tubular; limb 4–5-lobed, throat with usually a ring of scales or hairs. Stam. on the perianth mouth, 5, uniseriate, or 8–10, biseriate. Ov. 1–2-celled; ovule 1, pendulous in each cell. Fr. indehisc., rarely 2-valved. Embryo straight; endosp. present or o.—Shrubs or trees; l. opp. or alt., entire; stip. o; infl. fascicled, capitate, or racemed. iii. 457.

CXVI. ELÆAGNACEÆ.—Perianth inf., lepidote; tube narrow, limb globose, of 4 short triangular valvate segm. Stam. 4, on mouth of perianth. Ov. 1-celled; ovule 1, basal, erect; style long, stigma lateral. Fr. enclosed in thickened base of perianth tube, indehisc. Cotyled. thick, endosp. o.—Lepidote shrubs; l. alt., entire; stip. o; fl. axillary, solitary, or clustered. iii. 461.

§ 6. Ov. inf. (or perianth o in fem. of *Balanophoraceæ*), 1–3-ovuled, ovules without apparent coats. Seeds adnate to the walls of the pericarp.

CXVII. LORANTHACEÆ.—Fl. uni- or bi-sex. Cal. sup., limb truncate, toothed, or o. Pet. 3–5, usually long, distinct or connate, valvate. Stam. 3–5, opp. pet., or on them. Ov. 1-celled; ovule 1, erect, adherent to walls of ov. Fr. a 1-seeded berry. Seed adherent to the pericarp,

embryo straight, in fleshy endosp.—Tree parasites, branches sometimes articulate; l. opp. or alt., entire, or 0; stip. 0; infl. various. iii. 462.

CXVIII. Santalaceæ.—Fl. small, polygam. Cal. sup., segm. of limb 3, with a tuft of hairs on the face, valvate. Stam. 3 or 5, opp. perianth-segm. Ov. 1-celled; ovules 2 or 3, on free central placent. Fr. indehisc. Embryo axile in fleshy endosp.—Trees or shrubs; l. alt., entire; stip. 0; fl. axillary. iii. 474.

CXIX. Balanophoraceæ.—Fl. unisex.; male:—perianth-tube solid; segm. 3–5, valvate; stam. 3–5, connate; fem. fl. minute; perianth 0; ov. 1-celled, narrowed into a long simple style; ovule 1, adherent to pericarp. Fr. a minute achene. Embryo of 2–3 cells immersed in endosperm.—Stout, fleshy, leafless, brown root-parasites; infl. a cone-like monœcious spadix with the male fl. below, or diœcious; fl. mixed with densely crowded clavate bodies. iii. 477.

§ 7. Fl. unisex., very rarely polygam. Ov. of 1 carp. or syncarp., cells 1- or 2-ovuled; ovules if 2 collateral; styles as many as carpels.

CXX. Euphorbiaceæ.—Perianth inf., rarely 0 in one or both sexes, single or rarely of cal. and pet. Disk often present. Stam. 1, few, or many. Ov. 1–2- or 3-celled, cells 1–2-ovuled; ovules pendulous. Fr. of 2–3 loculicidal cocci, or a drupe or berry; cotyled. flat or folded, endosp. fleshy, very rarely 0.—Herbs, shrubs, or trees; juice often milky; l. alt., simple, rarely opp. or compound, usually stipulate; infl. various. iv. 1.

CXXI. Urticaceæ.—Fl. unisex. Perianth inf., lobed or partite. Stam. as many and opp. perianth divisions or fewer, fil. erect or incurved in bud. Ov. 1-celled, 1-ovuled; style simple or bifid, or stigma sessile, plumose. Fr. a samara, drupe, or achene, or a syncarp of confluent pericarps and perianths. Seed erect or pendulous; endosp. scanty or 0.—Herbs, shrubs, or trees, juice sometimes milky; l. often oblique, rarely opp. or compound, stipulate; infl. various; fl. small or minute, often sunk in a fleshy disk, or enclosed in a fleshy receptacle. iv. 78.

*Order of doubtful affinity.*

CXXII. Ceratophyllaceæ.—Fl. monœc.; male:—sep. 6–12, narrow, bifid, subvalvate in bud; stam. 10–20; anth. oblong, cells opening extrorsely, connective bicuspidate; fem. fl.:—sep. of male; ov. ovoid, 1-celled, style subulate, persist.; ovule 1, pendulous. Fr. a compressed, coriaceous achene, margins with 1 or 2 slender spines; cotyled. thick, radicle short, plumule many-leaved.—Submerged fresh-water herbs; stem very slender, much branched, fragile; l. whorled, cleft into filiform toothed segments. iv. 120.

## Class II.—GYMNOSPERMS (Order cxxiii.)

CXXIII. Cycadeæ.—Infl. diœcious, male a peduncled woolly cone of imbricate cuneate scales with many groups of globose anth. on its lower face; fem. a whorl of long spreading woolly toothed carpophylls, bearing naked orthotropous ovules. Seeds large, testa thinly fleshy, crustaceous within; endosp. copious; embryo small, axile.—Small trees, trunk stout, cylindric, clothed with compacted bases of petioles; l. in a terminal crown, dimorphic, of woolly lanceolate prophylla, and long petioled, pinnate true l., with alternate coriaceous narrow pinnules, circinnate in vernation. iv. 121.

## Class III.—MONOCOTYLEDONS (Order CXXIV. to end).

Series I. **Microspermous.**—Fl. uni- or bi-sex. Perianth sup., segm. usually biseriate, inner or both series corolline. Ov. 1-celled, placent. pariet., rarely 3-celled placent. axile. Seeds many, minute.

CXXIV. Hydrocharideæ.—Fl. unisex., enclosed in spathes. Sep. 3. Pet. 3 or 0. Stam. 3–15, anth. erect. Ov. 1- or sub- 3-celled; styles or stigmas 3–12. Fr. fleshy or membranous.—Aquatic, fresh- or salt-water plants; l. undivided. iv. 122.

CXXV. Burmanniaceæ.—Fl. bisex. Perianth subpersist., lobes or segm. biseriate, short, valvate. Stam. 3 or 6; anth. sessile on the perianth-tube. Ov. 3-celled with axile, or 1-celled with pariet. placent. Caps. loculicidal.—Annual herbs; l. narrow or 0; fl. spicate, racemed, or secund on the branches of a forked cyme. iv. 129.

CXXVI. Orchideæ.—Fl. irregular (except *Apostasia*), bisex. Perianth 6-partite; segm. biseriate, inner or both corolline. Stam. 1, confluent with the style in a column (2 in *Apostasia*); anth. 2-celled; pollen grains cohering in waxy or powdery masses. Ov. 1-celled with 3 pariet. placent. (3-celled in *Apostasia*), usually twisted. Caps. loculicidal.—Herbs or shrubs, often epiphytic, of various habit. v. 132.

Series II. **Epigynous.** — Fl. bisexual (except *Dioscoreaceæ*). Perianth sup. (except *Ophiopogon*), biseriate, one or both series corolline. Ov. 1–3-celled. Endosp. copious.

CXXVII. Scitamineæ.—Fl. irregular, uni- or bi-sex. Perianth biseriate, inner or both series petaloid, limb spreading (inner of 1 short pet. in *Musa*). Stam. 1 antherif. (5 in *Musa*). Ov. 1–3-celled; style long, stigma with a usually ciliate mouth.—Perennial herbs; l. penniveined; infl. usually spicate. iv. 238.

CXXVIII. Hæmodoraceæ.—Perianth sup. ($\frac{1}{2}$ inf. in *Ophiopogon*), petaloid; limb 6-lobed or -partite in 2 series. Stam. 6, opp., perianth-lobes; anth. erect or versatile. Ov. 3-celled, cells 1–2 ovuled; style columnar, stigma simple or 3-toothed. Fr. bursting irregularly before the seeds ripen.—Perennial herbs; l. radical, narrow; fl. spicate or racemed. iv. 266.

CXXIX. Amaryllideæ.—Perianth sup., petaloid; limb tubular or not below, 6-lobed or -partite in 2 series. Stam. 6, on the bases of the segm., fil. distinct or connate; anth. erect or versatile. Ov. 3-celled, cells many-ovuled; style short or long, stigma 3-lobed or -partite. Caps. loculicidal, or bursting irregularly.—Rootstock bulbous or tuberous; l. linear or lanceolate; scape few- or many-fld. iv. 268.

CXXX. Taccaceæ.—Perianth sup.; subglobose, 6-lobed in 2 series, mouth contracted. Stam. 6, on the bases of the lobes; fil. very short, hooded, anth. sessile in the hood, 2-celled. Ov. 1-celled; placent. 3, parietal, many-ovuled; styles 3, very short, stigmas broad reflexed. Fr. baccate, many-seeded.—Scapigerous herb; rootstock tuberous; l. radical, limb 3-partite, segm. pinnatifid; fl. umbellate, with broad outer bracts, and very long filiform pendulous inner. iv. 273.

CXXXI. Dioscoreaceæ.—Fl. unisex. (bisex. in *Trichopus*). Perianth sup.; limb rotate, 6-cleft in 2 series. Male fl.:—stam. 3 or 6, on the

base of the segm., surrounding a pistillode; anth. oblong or globose. Fem. fl.:—staminodes 3 or 6; ov. 3-gonous, 3-celled; cells 2-ovuled, stigmas 3, entire or bifid. Fr. a coriaceous 3-winged loculicidal capsule, dehiscing through the wings, with flat broadly winged seeds, or (in *Trichopus*) a berry with oblong seeds.—Twining herbs or shrubs, sometimes prickly (stem of *Trichopus* erect); l. opp. or alt., simple or 3–5-foliolate; infl. spicate or racemed. iv. 274.

SERIES III. **Coronariæ.**—Fl. bi- rarely uni-sex. Perianth inf., 4- or 6-partite in 2 series, one or both series corolline. Ov. sup., 1–3-celled. Endosp. copious.

CXXXII. ROXBURGHIACEÆ.—Perianth 4-partite in 2 series, segm. elongate, lanceolate. Stam. 4, on the bases of the segm.; anth. linear, erect, connective appendaged. Ov. ovoid, 1-celled; ovules few, basal. Fr. coriaceous, 2-valved. Seeds few, beaked, funicle fleshy, lacerate; endosp. hard, fleshy; embryo small.—A slender twining perennial; rootstock tuberous; l. alt. or whorled; fl. few, axillary, large. iv. 280.

CXXXIII. LILIACEÆ.—Fl. bi- rarely uni-sex. Perianth petaloid, 6-merous, lobes or segm. free or connate below. Stam. 6, on the perianth-tube or lobes, rarely hypog.; fil. distinct or connate. Ov. 3-celled, cells 2- or more-ovuled. Fr. a 3-celled berry or capsule. Seeds globose or flattened; endosp. horny or fleshy; embryo terete.—Herbs, rarely shrubs, with bulbs, or fibrous, tuberous, or creeping roots; l. various. iv. 281.

CXXXIV. PONTEDERIACEÆ.—Fl. bisex., irregular. Sep. 3, oblong. Pet. large, corolline, obovate, marcescent. Stam. 6, on the base of the segm., one longest, with the fil. laterally toothed. Ov. 3-celled; cells many-ovuled; style slender. Caps. membranous, loculicidally 3-valved. Seeds small; endosp. floury; embryo cylindric.—Fresh-water, erect, creeping or floating herbs; l. with often tumid spongy petioles; scape erect from the sheaths of the l.; fl. spicate or racemed, blue. iv. 295.

CXXXV. XYRIDEÆ.—Fl. sessile in the axils of the persist. rigid bracts of a cone-like spike. Perianth inf., 6-merous in 2 series; outer series (bracteoles?) of 3 scarious linear segm., the dorsal of which is petaloid, inner series petaloid, long-clawed. Stam. 3, fil. opp. and adnate to pet. Ov. 1-celled, placent. 3, pariet., many-ovuled; style short, deeply 3-fid. Caps. compressed, loculicidally 3-valved. Seeds many, minute, ribbed; endosp. floury; embryo minute.—Rush-like scapigerous herbs; l. radical, very narrow, rigid; fl. yellow. iv. 296.

CXXXVI. COMMELINACEÆ.—Fl. regular or not. Perianth marcescent, 6-partite in 2 series, sep. 3, pet. 3, clawed, claws distinct or connate. Stam. 6, on the bases of the segm., perfect or anth. of 2–4 imperfect; fil. often bearded. Ov. 3-celled, cells 1–few-ovuled; style often bearded and enlarged below the tip. Capsule loculicidal (indehisc. in *Pollia*); endosp. floury; embryo minute.—Herbs or undershrubs; l. alt., base or petiole sheathing; infl. cymose or panicled. iv. 298.

SERIES IV. **Calycinæ.**—Perianth inf., rigid or herbaceous, lobes or segm. biseriate, inner series rarely subcorolline. Ov. sup., 1–3-celled; endosp. copious.

CXXXVII. FLAGELLARIACEÆ.—Fl. small, uni- or bi-sex. Perianth rotate, 6-partite, persist., segm. subequal. Stam. 6, hypog. or on the

bases of the segm.; fil. filiform, anth. erect. Ov. 3-celled; cells 1-ovuled; style short, 3-cleft, or stigmas sessile. Fr. small, globose, indehisc., 3-celled or with 1–2 pyrenes. Seeds various; endosp. floury; embryo minute.—Tall, erect, or climbing (by leaf-tendrils), leafy perennials; l. alt., base or petiole sheathing; infl. panicled. iv. 316.

CXXXVIII. JUNCACEÆ.—Perianth inf., 6-partite in 2 series, persist.; segm. narrow, thin or coriaceous. Stam. 3 or 6, on the bases of the segm.; anth. erect, basifixed. Ov. 1- or 3-celled, many-ovuled; stigmas 3. Caps. 1–3-celled, loculicidally 3-valved. Seeds many, erect; endosp. hard; embryo small.—Stems tufted, erect; l. terete or compressed, sheathing or reduced to sheaths; fl. in axillary or terminal cymes, green or brown. iv. 318.

CXXXIX. PALMEÆ.—Fl. uni- or bi-sex. Perianth. inf., 6-partite or lobed in 2 series, coriaceous, rarely herbaceous, inner series usually valvate. Stam. 3 or 6, rarely more, on the base of the perianth; anth. versatile. Ov. 1-3-celled, or of 3 distinct or connate carps., cells 1–2-ovuled. Fr. various, never capsular.—Shrubs or trees, armed or not. Stem erect, scandent, or decumbent; l. alt., variously compound, very rarely simple, often pinnate or palmatisect; infl. various, at first enclosed in a woody or coriaceous spathe; fl. usually small or minute, green or yellowish, rarely red. iv. 319.

SERIES V. **Nudifloræ.**—Perianth 0, or of scales or bristles. Ov. sup., 1-celled, or syncarp. Seeds usually endospermous.

* *Infl. enclosed in a (sometimes imperfect) spathe; trees, shrubs, or herbs.*

CXL. PANDANACEÆ.—Fl. diœcious. Perianth 0. Male fl.:—stam. many, fascicled or spicate on the spadix; fil. distinct or connate; anth. erect, basifixed; pistillode 0 or minute. Fem. fl.:—staminodes minute or 0; carp. sessile, distinct or connate in bundles; ovules solitary, or many pariet., stigmas sessile or subsessile. Fr. an oblong or globose dry or fleshy syncarp.—Trees or shrubs, erect or scandent; l. usually trifarious, margins and keel spinous; spadix globose or cylindric; spathes imbricating. iv. 338.

CXLI. TYPHACEÆ.—Perianth 0. Fl. monœcious, crowded in unisexual dense catkin-like cylindric spikes, mixed with capillary hairs; Male fl.:—stam. solitary or fascicled, fil. capillary, anth. basifixed, erect, 2-celled. Fem. fl.:—a capillary fil. bearing a minute narrow 1-ovuled ov. narrowed into a capillary style with a linear stigma. Fr. a minute achene. Seed pendulous; endosp. floury; embryo cylindric.—Marsh- or water-herbs; rootstock perennial, stout; l. linear, erect, biconvex; spathe imperfect. iv. 342.

CXLII. ARACEÆ.—Fl. small or minute, unisexual, usually on bisexual spadix with the fem. fl. below, rarely bisexual. Perianth 0 or of scales. Male fl.:—anth. 2–4-celled, distinct or connate. Fem. fl.:—ov. sessile, 1–3-celled, cells 1- or more-ovuled. Fr. a 1- or few-seeded berry; embryo small, in copious endosp. or macropodous, and endosp. 0.—Terrestrial or aquatic herbs with radical l., or suffruticose climbers; l. various; spathe herbaceous, convolute.

* *Fl. solitary or binate, sunk in the sides or surface of small or minute floating lenticular or globose fronds.*

CXLIII. LEMNACEÆ.—Small or minute, gregarious, floating, monœcious, scale-like, green fronds. Fl. few, most minute, in fissures of the

frond, naked or in a sheath. Perianth o. Male fl.:—stam. 1 or 2; anth. 1- or 2-celled. Fem. fl.:—ov. 1-celled; style short, stigma truncate o infundibular, ovules 1–7, basal. Fr. a membranous utricle. Seeds ribbed; endosp. o; embryo cylindric. iv. 366.

SERIES VI. **Apocarpous.**—Perianth 1–2-seriate, or o. Ov. sup., of one or more distinct 1- or more-ovuled carpels. Endosperm o.

CXLIV. TRIURIDEÆ.—Fl. unisex. Perianth inf., 4–8-partite; segm. valvate in bud, persist. Stam. 3–8; anth. subsessile, cells confluent. Ov. of many, distinct, 1-ovuled carpels; styles ventral or basal, persist. Fr. a head of minute 1-seeded carp., pericarp hard or soft. Embryo minute, globose, endosp. hard.—Leafless, subsimple, wiry saprophytes; infl. racemose or corymbose. iv. 367.

CXLV. ALISMACEÆ.—Fl. uni- or bi-sex. Perianth. inf., 6-partite in 2 series; sep. 3, herbaceous, persist.; pet. 3, involute in bud, deciduous. Stam. 6–9, perig.; anth. versatile. Ov. of few or many, distinct, 1-ovuled carp.; styles short. Fr. of many achenes. Endosp. o. Embryo hooked. —Perennial, marsh or aquatic plants; l. radical, entire; fl. whorled or umbelled. iv. 369.

CXLVI. NAIADEÆ.—Fl. uni- or bi-sex., often inconspicuous, naked or in a sheath. Perianth inf., tubular or of 1 or more segm., or o. Stam. 1–4 or 6, hypog. or perig.; anth. 1–2-celled. Ov. of 1–4, 1-ovuled, free carp. Fr. apocarp. Seed erect or pendulous; endosp. o; embryo macropodous.—Fresh- or salt-water herbs, of various habit, foliage, and infl. iv. 371.

SERIES VII. **Glumaceæ.** — Fl. in the imbricating bracts of heads or spikelets, uni- or bi-sexual. Perianth o, or of minute scales, or of bristles, rarely with sheathing bracteoles (biseriate in *Eriocauloneæ*). Ov. sup., 1-celled, 1-ovuled, or in *Eriocauloneæ* of 3 1-ovuled cells. Endosp. copious.

CXLVII. ERIOCAULONEÆ.—Fl. minute, in involucrate heads, unisex. Perianth of usually 6 membranous sep. in 2 series. Stam. 6 or fewer. Ov. sup., 3-lobed, 3-celled. Fr. a membranous, loculicidally 3-valved caps.—Scapigerous herbs; l. narrow. v. 1.

CXLVIII. CYPERACEÆ.—Fl. in spikelets of imbric. bracts (glumes), uni- or bi-sex. Perianth o, or of hypog. scales or bristles. Stam. 1–3, anth. basifixed. Ov. sup. (enclosed in a utricle in *Carex*); style 1, stigmas 2–3; ovule erect. Fr. indehisc. Embryo in base of copious endosp.—Grass-like herbs; stem terete or 3-angled; l. narrow, sheath entire. v. 12.

CXLIX. GRAMINEÆ.—Fl. in spikelets of imbric. bracts (glumes), uni- or bi-sex. Perianth of 2 or more minute, hypog. scales, or o. Stam. 3, rarely 1, 2, or many; anth. versatile. Ov. sup.; styles 2 (rarely 1), distinct or united below, stigmas penicillate or feathery; ovule erect. Fr. indehisc. Seed usually adherent to the membranous or coriaceous pericarp. Embryo towards the base and outside of copious floury endosp.—Grasses; stem terete or compressed; l. usually narrow, sheath split to the base. v. 113.

# APPENDIX II.

## ON THE FORESTS AND WASTE LANDS OF CEYLON.

With a Map showing the Forest areas.*

*By* A. F. Broun, Esq., *Conservator of Forests.*

The area of uncultivated lands in Ceylon exceeds 20,000 of the 25,365 square miles of country contained within the Colony. The proportion of good forest in these 20,000 square miles is unfortunately small, the largest portion being taken up by scrub and by grass-covered stretches of country called *patanas*, which find their greatest development in the hills of the Province of Uva. The scrub is partly natural, especially so on the sea-coast and in the arid subzone, and partly the result of a destructive method of cultivation known as *chena*, and which consists in clearing and burning jungle and in raising crops for two or three years on the area cleared. Now that a careful control is exercised over this cultivation, nothing but small forest is felled; but not many years ago valuable forests were ruthlessly felled, and their ashes were utilised as manure for the crops which were raised. Where such a system of cultivation has been in force, it takes years for the forest to take again a useful character. Usually a thorny scrub grows up; or, as is the case in the Eastern Province, a dense growth of Iluk grass (*Imperata arundinacea*) springs up; or again, as in the moist districts, the ground gets covered with *Lantana*, or, worse, because they are not soil-improvers, by *Hedyotis*, *Ochlandra stridula*, or *Gleichenia linearis*.

The patanas were probably at one time covered with trees, such as will be described later on for the Park country, but fires and grazing have destroyed the majority of these, except in sheltered places such as gullies or ravines. The trees which are to be found on the patanas are, at higher elevations, *Rhododendron arboreum*, and, from 4000 feet downwards, *Careya arborea*, known in Ceylon as 'Patana Oak,' *Phyllanthus Emblica*, *Terminalia Belerica*, *T. Chebula*, and *Pterocarpus Marsupium*. These are, with few exceptions, the only trees which can stand the heavy grass fires; but in the gullies,

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* My cordial thanks are due to F. H. Grinlinton, Esq., Surveyor-General of Ceylon, for permission to reproduce this Map and that of the Forest Areas; and to P. D. Warren, Esq., Assistant Surveyor-General, for his kindness in supervising their reproduction.—J. D. Hooker.

where they are more sheltered, other species, which are less robust and which are the same as those found in forests at the same elevation, are able to live and to reproduce themselves.

In the backward state of the survey of the island it is not yet possible to state the area of the real forests, but they cannot much exceed 5000 square miles, although a larger area is, for the present, set aside for reservation, which includes stretches of scrub and patana englobed within the forests. The most important belt of forest stretches from the Northern Province, mostly between the centre line of the island and the east coast down to the Hambantota District, but important blocks are also found scattered over the rest of the island, chiefly in the Puttalam District of the North-western Province and in the upper hills, but also in the Kurunegala District of the North-western Province, in the Western, Southern, and Sabaragamuwa Provinces, where are still to be found, in isolated blocks, the remains of what was at one time the extensive Sinha Raja Forest.

The vegetation of the forests varies especially according to rainfall and elevation, and the forests can be classified according to the following zones and subzones:—

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| *Dry zones.* Rainfall 35 to 70 inches. | Arid zone. Rainfall 35 to 50 inches.<br>Dry zone proper. Rainfall 50 to 70 inches. |
| *Intermediate zone.* | Rainfall 70 to 80 inches, |
| *Wet zones.* Rainfall 80 inches and more. | Low country zone from sea-level to 4000 feet.<br>Mountain zone above 4000 feet. |

The **Dry Zone.**—This includes about three-fifths of the island, viz., the whole of the Northern, North Central, and Eastern Provinces, the Puttalam District and portion of the Kurunegala and Chilam Districts, the North-western Province, the northern part of the Central Province, about two-thirds of the Province of Uva, the Hambantota District of the Southern Province, and the Kolonna Korale of the Province of Sabaragamuwa. The Western Province is therefore the only one of which no portion enters in the dry zone.

The **Arid Zone** occupies the North-western end of the island in the Puttalam, Mannar, and Jaffna Districts, and the South-eastern in the Hambantota District. The characteristic trees and shrubs of this subzone are *Salvadora persica*, *Azima tetracantha*, and *Acacia eburnea* near the coast, and *Acacia planifrons* on the island of Mannar.* The woody vegetation is usually shrubby and thorny, being represented by *Carissa spinosum*, *Zizyphus Jujuba*, *Z. Œnoplia*, *Z. rugosa*, *Randia dumetorum*, *Flacourtia Ramontchi*, &c.

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* *Acacia Sundra* is also found in the Puttalam and Hambantota Districts, *Albizzia amara* in the Mannar District, and *Strychnos potatorum* not far from the sea.

Further from the coast the forest vegetation is composed of the same species as of the forests of the dry zone proper, but the trees are usually smaller and the undergrowth is composed mainly of *Memecylon* and of *Stenosiphonium Rulyselianum.* The Palmyra palm (*Borassus flabelliformis*) is found on sandy soil both in this sub-zone and in the dry zone proper. It is most abundant in the littoral districts, especially in the Jaffna Peninsula.

The forests of the **Dry Zone proper** are the most important to the forester, not only because they are the most extensive, but also because they contain most of the valuable timber trees. The most important of these are Satinwood (*Chloroxylon Swietenia*), found on sandy soils, and attaining its best dimensions in the Puttalam and Batticaloa Districts; Ebony (*Diospyros Ebenum*), which prefers rocky, undulating ground, and which, although found occasionally in the wet, low country, is most abundant in the Northern, North Central, and North-western Provinces, and in the Trincomalie and Matale Districts; Palu (*Mimusops hexandra*), which is found on more clayey soils from the north to the south of the island. It attains an enormous size, and grows best, if anywhere, in the Northern Province. It is one of the ironwoods of commerce. Trincomalie wood (*Berrya Ammonilla*) is found in moist but well-drained places. It extends into part of the wet zone, but the trees are usually of small size. The finest trees are found in the eastern portion of the Province of Uva. Milla (*Vitex altissima*), one of the strongest of Ceylon timbers, extends also into the wet zone, where it is not uncommon; but, like the *Berrya*, it is a much finer tree in the dry zone, especially in the Eastern Province. The same may be said of Ranai (*Alseodaphne semecarpifolia*), although it is not so common in the wet zone as Milla. The Ebenaceæ are (apart from Ebony) represented in this zone chiefly by *D. ovalifolia*, while *D. crumenata*, *D. oocarpa*, *D. Embryopteris*, and *D. montana* are also found abundant in certain localities; and *Maba buxifolia* is a small tree which is by no means uncommon even in the arid zone. Of the Guttiferæ we have chiefly *Garcinia spicata*, *Calophyllum Burmani*, and, near streams or in groves, planted before the memory of man, *Mesua ferrea.* The Dipterocarps, which are so characteristic of the Low Country wet zone, are almost absent, being only represented by *Vatica obscura* in moist soils in the Eastern Province, and by *Hopea cordifolia* along streams in Southern Uva and Sabaragamuwa. Among trees which are characteristic of this zone the most common are *Polyalthia longifolia*, *P. coffæoides*, *Crateeva Roxburghii*, *Pterospermum suberifolium*, *Sterculia fœtida*, *Azadirachta indica*, *Walsura Piscidia*, *Pleurostylia Wightii*, *Sehleichera trijuga*, *Nephelium Longana*, *Odina Wodier*, *Cassia Fistula*, *C. marginata*, *Bauhinia tomentosa*, *Acacia leucophlæa*, *Acacia ferruginea*, *Gyrocarpus Jacquini*, *Eugenia Jambolana*, *Barringtonia acutangula*, *Adina cordifolia*, *Canthium didymum*, *Bassia longifolia*, *Terminalia glabra* (near streams and tanks), *Strychnos Nux vomica*, *Cordia Rothii*, *Stereo-*

*spermum chelonioides*, *Euphorbia antiquorum*, *Sapium insigne*, *Hemicyclia sepiaria*, *Mischodon zeylanicus*, *Holoptelea integrifolia*, &c.

The most common shrubs are *Polyalthia Korinti*, *Allophyllus Cobbe*, *Ochna squarrosa*, *Cassia auriculata*, *Alangium Lamarckii*, *Webera corymbosa*, *Randia dumetorum*, *Gmelina asiatica*, *Memecylon*, *Glycosmis pentaphylla*, and *Dimorphocalx glabellus*. Creepers and climbers are not so well represented as in the moister zones, the most abundant being *Hugonia Mystax*, *Ventilago maderaspatana*, some species of *Vitis*, *Derris scandens*, *D. sinuata*, &c. The most beautiful orchids found in this zone are, without doubt, *Saccolabium guttatum*, which is found in the Eastern Province, and *Vanda Roxburghii* and *V. spathulata*, which are found chiefly not far from the sea. *Vanda parviflora* and *Saccolabium Wightianum* are not uncommon, while a pretty little white-ground orchid, *Habenaria pterocarpa*, is found in rocky places. The ferns of this zone are not abundant, the *Adiantum caudatum* penetrating farther into the dry districts than any other, while *Hemionitis arifolia* and *Gymnopteris quercifolia* are found in dark and moist places, while on rocks grow *Cheilanthes mysorensis*, *C. laxa*, and the tiny *Ophioglossum lusitanicum*.

In the **Intermediate Zone** trees of both the dry and the low-country moist zone are to be found, such as *Berrya Ammonilla*, *Nephelium Longana*, *Mesua ferrea*, *Artocarpus integrifolia*, *Xylopia parviflora*, *Albizzia stipulata*, *A. odoratissima*, *A. Lebbek*, &c.; and there are a few species which, although they are found elsewhere, can be said to be characteristic; these are *Filicium decipiens*, *Chickrassia tabularis*, and *Melia dubia*. *Terminalia Belerica* attains an extraordinary size in this zone, in which are other gigantic trees, like *Tetrameles nudiflora* and *Ailanthus malabarica*.* Among the shrubs, *Vitex Negundo* is probably the most characteristic. Another characteristic feature of this zone is the great abundance of creepers, which cover the tallest trees and render forest operations extremely difficult. Some very handsome ferns grow in this zone, the most noticeable being *Aspidium decurrens*, *A. subtriphyllum*, *A. cicutarium*, and *Adiantum lunulatum*.

The Park country of Uva can be included in this zone. It comprises the low lands on the eastern boundary of that province; and it has a quite characteristic flora, very similar to that of the Sub-Himalayan forests. The trees which are found here are found only on the patanas and occasionally elsewhere, the most noteworthy being *Anogeissus latifolia*, *Butea frondosa*, *Terminalia Chebula*, *T. Belerica*, *Zizyphus xylopyra*, *Pterocarpus Marsupium*, *Miliusa indica*, *Sterculia colorata*, *Gmelina arborea*, and *Diospyros melanoxylon*. The undergrowth is, as in the sub-Himalayan forests, mostly grass

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* Although *Dipterocarpus zeylanicus* and *Stemonoporus acuminatus* extend into this zone, the only characteristic Dipterocarp known, so far, in this zone is the *Balanocarpus zeylanicus*, which has been found only in the *Kurunegala District*.

(*Imperata arundinacea*). Near water-courses the flora is that of the ordinary dry zone type.

The **Wet Zone** includes the Western Province, the Province of Sabaragamuwa excluding the Kolonna Korale, the Galle and Matara Districts of the Southern Province, the Hill Districts of the Central and Uva Provinces and about one-half of the Kurunegala and Chilaw Districts of the North-western Province, or, in a few words, the South-western and South Central portions of the island. It is the portion which receives the full force of the South-west monsoon, and includes the higher lands affected by the North-east monsoon. The rainfall usually ranges from 80 to 200 inches, but it exceeds even this in some places, and rumour has it that in Eratne, to the South-west of Adam's Peak, it actually does not fall far short of 400 inches.

The **Low-country Wet Zone** is the country *par excellence* of the Dipterocarps. In the Chilaw and Kurunegala Districts, and in the Northern portion of the Colombo District, they are represented only by Dipterocarpus zeylanicus, but further South and East they increase in number and species until, in many cases, they form almost the entire forest. No doubt, several new species will have to be added, and even since the first volume of Trimen's *Flora* has been published fresh discoveries have been made, a case in point being the *Stemonoporus* (*? Vatica*) *Lewisi*, which was found by Mr. F. Lewis of the Forest Department at about 1000′ altitude above Pelmadulla. The curious almost wingless fruit of *Shorea lissophylla* was also found near the Bentote river in the Western Province. The forests of this zone, where they have been saved, are to the eye the most magnificent of the whole island, the trees often reaching a height of 100 feet to the first branch. On this account the trees are often difficult to identify, and it is probable that many are still unnamed, especially as it is not always possible to hit on new species at the time when they are in flower or fruit. The most beautiful of these forests is probably the forest of the Hinidun Pattu, in the Southern Province; in it the most important Dipterocarps are *Dipterocarpus hispidus*, which in the South almost replaces *D. zeylanicus*, *D. glandulosus*, *Shorea oblongifolia*, *Doona trapezifolia*, which extends up to about 3000′ above sea level, *D. cordifolia*, *D. macrophylla*, *D. congestiflora*, which produces a valuable timber, *Hopea discolor* and *Vatica affinis*.

*Vatica Roxburghiana* is found near streams and in lands subject to inundation in the Western Province and in Sabaragamuwa, while *Vateria acuminata*, which also loves the neighbourhood of water, is found on more rocky ground. The Dipterocarps which are able to ascend to an elevation of 4000′ are *Doona zeylanica* and *D. Gardneri*, and *Stemonoporus Gardneri*, which has been found up to nearly 5000 feet.

Among the natural orders, which are also widely represented, are the *Guttiferæ*, the *Ebenaceæ*, and the *Sapotaceæ*. The first-named is represented chiefly by the ironwood *Mesua ferrea* and *M. Thwaitesii*,

by *Calophyllum spectabile*, *C. Burmanni*, which extends into the dry country, *C. bracteatum*, *C. tomentosum*, *Garcinia Cambogia*, *G. Morella* (the gamboge tree), *G. terpnophylla*, and *G. echinocarpa*, which latter grows up to 6000′ elevation. The *Ebenaceæ* are particularly abundant in the forests of the Adam's Peak Range, and in the Pasdun and Hinidun Korales.

Ebony, as has already been mentioned, is found in small quantities in this zone, but the most important tree of this family, which is unfortunately almost extinct, the Coromandel or Calamander wood of commerce, *Diospyros quæsita*, is still found here and there in the Pasdun Korale and in the Hinidun Pattu. Attempts have been made for several years to obtain the fruit in order to propagate the species artificially, but, although rewards have been offered, none has been obtained.

The other most noticeable trees of this family are described by Mr. F. Lewis, who has made a special study of them.

In the wet forests, extending from the mountain known as the Haycock into the Sabaragamuwa Province, the most noticeable examples of the *Ebenaceæ* are *Diospyros Toposia*, *D. Gardneri*, *D. insignis*, and *D. Thwaitesii*. The first of these is found up to 3000 feet altitude, while the last, though endemic, is restricted to the areas of high rainfall. *D. pruriens* is found very sparingly in the wet forests towards Adam's Peak, and in one place in the Western Province. A remarkable species, possibly a form of *D. Ebenum*, locally known as 'Kallu kiria,' occurs at the foot of the Rakwana hills, and is conspicuous by its black lace-like heart-wood, but little is known of its flowers or fruit. One of the most common, but valueless, of the order is *D. insignis*, which extends up to 2000 feet altitude in the West of Ceylon.

The *Sapotaceæ* are also well represented, especially in parts of the Matara District. The most important are *Chrysophyllum Roxburghii*, *Isonandra lanceolata*, *Bassia fulva*, *B. neriifolia*, which lines the banks of rivers, *Palaquium petiolare*, *P. grande*, which extends into the mountain zone, and *Mimusops Elengi*, which is also found in the dry zone. Among the more noteworthy trees belonging to other natural orders, the following are characteristic of this zone:—*Dillenia retusa*, *Wormia triquetra*, *Cullenia excelsa*, *Elæocarpus serratus*, *Kokoona zeylanica*, *Canarium zeylanicum*, *C. brunneum*, *Lasianthera apicalis*, *Pometia eximia*, *Campnosperma zeylanicum*, which in places forms almost pure forest, *Pericopsis Mooniana*, near water-courses, *Adenanthera pavonina*, *A. bicolor*, *Pygeum zeylanicum*, *Carallia integerrima*, *C. calycina*, especially in the Galle District, *Anisophyllea zeylanica*, *Homalium zeylanicum*, *Symplocos spicata*, the three *Myristicas* (*M. laurifolia*, *M. Horsfieldia*, and *M. Iriya*). Various species of *Cinnamomum* and *Litsea* are also abundant; and, among the *Euphorbiaceæ*, *Bridelia retusa*, *B. Moonii*, *Aporosa latifolia*, *A. Lindleyana*, *Ostodes zeylanica*, *Chætocarpus castanocarpus*, and *Macaranga tomentosa* are the most

common; while among *Urticaceæ* there are numerous figs, *Artocarpus integrifolia*, *A. nobilis*, and *Trema orientalis*.

Among the shrubs which characterise this zone may be mentioned *Humboldtia laurifolia*, *Mæsa indica*, *Agrostistachys longifolia*, *A. Hookeri*, *Ixora coccinea*, *Ardisia Moonii*, &c.

Most of the palms of Ceylon are found in this zone. The most important by far is *Caryota urens*, the toddy and sugar of which provide many jungle people with means of existence. The Talipot palm (*Corypha umbraculifera*) is found in several forests, especially in the Kurunegala District, and is noteworthy for the enormous panicle of flowers which the male tree produces, and for its leaves, which are used for umbrellas, fans, mats, &c. The *Nipa fruticans* is characteristic of brackish waters, while several species of *Calamus*, with the help of their hooked tendrils, climb to the summits of the highest trees.

Among the characteristic climbers may be mentioned *Coscinium fenestratum*, *Ancistrocladus Vahlii*, *Entada scandens*, *Acacia concinna*, *Strychnos cinnamomifolia*.

The most beautiful orchid of this zone is the *Dendrobium Macarthiæ;* and among the most interesting ferns may be mentioned *Gleichenia linearis*, which covers large extents of country, *Blechnum orientale* and *Nephrolepis exaltata*, which, after the first-named, are the most common, *Cyathæa sinuata*, which is only found in the Southern Province, *C. Walkerii*, the tree fern of the low country, *Thamnopteris Nidus*, the so-called Bird's-nest fern found growing generally on trees, *Asplenium rutæfolium*, *Diplazium lanceum*, *D. Schkuhrii*, *Aspidium Thwaitesii*, *Lastræa deparioides*, *Niphobolus Gardneri*, *Pleopeltis pteropus* (var. *minor*), *Tænites blechnoides* (in the Matara District), *Drymoglossum heterophyllum*, *Stenochlæna palustris*, *Polybotrya appendiculata*, *Gymnopteris variabilis*, *G. contaminans*, *G. subcrenata*, *G. quercifolia*, *Acrostichum aureum* (generally not far from the sea in swampy places), *Schizæa digitata*, *Angiopteris evecta*, *Ophioglossum pendulum*, and *Helminthostachys zeylanica*. *Botrychium daucifolium* and *Oleandra musæfolia* extend into the mountain zone.

The forests of this zone are of by no means so large in extent as those of the dry zone; they usually occur in isolated blocks, covering ridges and separated by stretches of chena or by paddy fields. The most important blocks are the forests that in former days formed part of the extensive Sinharaja Forest; they are situated in the Galle District of the Southern Province, the Pasdun Korale of the Western Province, and the Kukulu Korala of the Province of Sabaragamuwa. The lower forests of the Adam's Peak range also belong to this zone.

The **Mountain Zone.**—The forests of this zone form the cap of the island. It is from them that all the most important rivers take their rise, and for the preservation of water supply it is therefore necessary that they be preserved. The highest summits of the

island, unless they are too rocky for tree growth, are covered with trees, which form a continuous sheet from Pedro Peak to Hakgalla, from thence to Totapella, and in a curved line to Kirigalpota and Adam's Peak. The forests are found on both sides of the ridges, but the tea estates of Bagawantalawa and Maskeliya have encroached far up the slopes. It is not improbable that to these clearings is due the silting up of the lower reaches of the Kelaniganga, and the consequent frequent inundations which are a plague in the low country. A wise rule now prevails to allow no sale of Crown lands above 5000 feet, and there are not many of these left between 4000 and 5000 feet. The general character of the forests of the mountain zone is the same as that of the dry country; the trees are flat topped, not generally very tall, and the undergrowth is not unlike in general appearance; the most characteristic are several species of *Eugenia*, *Calophyllum Walkerii*, *Michelia nilagirica*, *Gordonia zeylanica*, *Elæocarpus obovatus*, *E. glandulifer*, *Meliosma pungens*, *Litsea* (5 species), *Rhododendron arboreum*, &c.

The undergrowth consists, especially above 5000 feet, mostly of the numerous species of *Strobilanthes*, which flower and die down every twelve years, and some of which reach a height of 20 feet and a girth of trunk of 12 inches. During the flowering time the forest is a blaze of colour, and swarms of bees, attracted to the flowers, produce abundance of honey, which has a peculiar flavour. When the seed ripens, thousands of jungle fowl suddenly appear wandering up from the low country for the food, which they obtain abundantly.

Besides these plants, there are also large quantities of the little hill Bamboo (*Arundinaria*), species of *Coleus*, *Hedyotis*, and ferns, of which the most noticeable and characteristic is the handsome tree-fern *Alsophila crinita*, which is found in moist places, in gullies, or on the face of moist rocky precipices. The stem of this occasionally attains a length of 40 feet. Among others, the most interesting are *Lomaria Patersoni*, *Lastræa Beddomii*, *Leptogramme Totta*, *Osmunda javanica* (in sunny places near streams), *Diacalpe aspidioides*, *Doodia dives*, and *Maranta fraxinea*, the last being only found in the lower portion of this zone, replacing *Angiopteris evecta*, which it closely resembles.

The moisture in the atmosphere causes the branches and trunks of trees to be covered with epiphytic plants, such as numerous mosses, ferns, of which some *Hymenophyllums* closely resemble the mosses, and orchids, the most beautiful of which latter are *Dendrobium aureum*, *Cœlogyne odoratissima*, and *Eria bicolor*, and creeping plants such as *Piper*, *Medinilla fuchsioides*, &c. In this zone are found the strange *Balanaphoras*, which are found at higher elevations only within the Tropics.

European genera are found mostly in this zone, but, on the whole, they occur chiefly in well-lit localities, or in patanas, and, excepting *Rhododendron arboreum*, the majority are shrubs or herbaceous plants, such are *Berberis*, *Cardamime*, *Viola*, *Hypericum*,

*Rubus*, *Viburnum*, *Anaphalis*, *Lobelia*, *Campanula*, *Gentiana*, *Pedicularis*, *Drosera*, &c. Exceptions to this rule are *Impatiens*, of which there are numerous species, some extremely handsome, *Vaccinium* and *Ilex*, which all grow under shade.

This concludes my sketch of the forest flora of Ceylon. It is a very incomplete one, but with a wealth of species to choose from it is difficult not to omit a number of characteristic ones. To this may be attributed any glaring omissions, as well as to the fact that the writer of this notice can in no way lay any claim to being considered anything botanically but an amateur.

A. F. BROUN,
*Conservator of Forests, Ceylon.*

*Colombo, 27 January, 1899.*

# APPENDIX III.

## ON THE DISTRIBUTION OF THE RAINFALL IN CEYLON.

With a Map showing the Average Annual Rainfall.

*By* F. Lewis, Esq., *of the Forest Department.*

The island of Ceylon lies to the South-east of the Southern extremity of the great peninsula of India, and is situated between North Latitude 5° 53′ and 9° 51,′ and East Longitude 79° 42′ and 81° 55′. Its total area is about 25,360 square miles, or, roughly, one sixth less than the area of Ireland. The greatest length and extreme breadth of Ceylon are 271 and 137 miles, respectively. From the Indian coast the island is divided only by a narrow strip of water too shallow for our large ocean steamers to cross, so that vessels bound for the Eastern ports of India are obliged to pass to the South of Ceylon.

Although Ceylon has not been entirely free from those great convulsions of the earth which have so strikingly affected Java and neighbouring islands, it must, nevertheless, be regarded as practically outside volcanic action, and beyond the limits of hurricanes. Cyclonic storms have at long intervals visited the country, but none of such destructive severity as to affect the prosperity of the island.

The prevailing monsoons are the N.E. and S.W., during which the vegetation of the country passes from rest to activity.

The rainfall is heaviest in the immediate neighbourhood of Adam's Peak, and, speaking generally, diminishes towards the North-west and South-east. Dividing the island into zones, according to the average amount of precipitation, these may be conveniently classified as follows :—

(1) The driest zone—under 50 inches of rain per annum—consists of two rather narrow strips; one, starting from the extreme northern point of the island, runs for about 100 miles along the North-west coast; the other starts from near the Southern extremity and runs along the South-east coast to near Batticaloa Lake.

(2) The zone of 50–75 inches is enclosed between the two above-mentioned strips, and includes also the whole North-eastern sea-board (from Batticaloa Lake). This zone comprises the largest area of the country.

(3) Enclosed within the crescent formed by the last district is the zone of 75–100 inches, lying roughly along the outside limit of the hill country, this zone forming a sort of elongated horse-shoe band of which the two horns are situated at Colombo and Galle.

The inner limit between this zone and the next presents, however, an extremely irregular outline. In this region is found much of the mixed flora of the country, separating the wet from the dry regions.

(4) The 100–150 inch zone, within the last, comprises most of the mountainous part of Ceylon, including its highest peak.

(5) The 150–200 inch zone is a nearly oval region, wholly surrounded by the last, and nowhere quite reaching the sea-coast. At its northern end lies

(6) the zone of over 200 inches, a small area within the influence of Adam's Peak. Here the greater portion of the rainfall occurs during the south-west monsoon, at which period a fall exceeding 10 inches in the twenty four hours is by no means uncommon.

It will be seen, therefore, that the area of greatest rainfall corresponds with the mountainous country, and is marked by the path of the South-west monsoon, Negombo, 19 miles north of Colombo, with a fall of about 62 inches, being its northern edge, and Galle, with a 91 inch average, being the southern edge of the maximum monsoon path. Following the tract of maximum fall towards the great central mass of mountains, the increase is very pronounced, culminating with an average of over 230 inches at Padupola, on the confines of the Central Province.

The average temperature of Ceylon varies both with the time of year and the rainfall; but, taking the hottest and coolest stations, it ranges from 81°7′ at Mannar and Jaffna (both on the coast), to 57°9′ at Nuwara Eliya (6188 feet above sea-level). The changes in temperature, according to the time of year, may be succinctly illustrated by a statement of the highest and lowest average monthly mean temperature at Jaffna and Nuwara Eliya. At the former the highest monthly average is 85°5′ in April, and the lowest 77°3′ in December; while, at the latter, the extreme averages are 60°4′ in May, and 56°5′ in January.

The barometer (uncorrected for sea-level) shows an absolute range from 30·157 inches, the highest recorded in 1887, at Jaffna, to 23·800 inches, in 1886, at Nuwara Eliya. The range at particular localities is small, as will be seen from the appended table, taken from the statistics issued from the Surveyor General's-Office, which is confined to the sixteen stations possessing umbroken records, in most cases for nearly thirty years.

The movement of the atmosphere is much influenced by the distance from the sea. Thus at Kandy, roughly in the centre of Ceylon, the average diurnal velocity of the wind ranges from 28 miles in April to 84 in August. At Hambantota, on the sea-coast, the corresponding figures are 149 miles in March, and 268 miles in August. Again, the average diurnal velocity at Vavuniya, which is situated about midway between the East and West coasts, ranges from 31 miles to 165 miles, while, at Ratnapura, with its high rainfall, it only varies from 18 to 69 miles.

## METEOROLOGICAL TABLE.

*The following Table is compiled from the Ceylon Administration Reports for* 1897 (*Part II., Scientific*) *by Mr. F. H. Grinlinton, Surveyor-General, and is confined to* 16 *Stations, from which unbroken records have been preserved.*

| Name of Station. | Altitude of Station. | Annual Rainfall in Inches. | Barometer (reduced to 32° F.). | | Mean Air Temperature. | Mean Daily Movement of Wind. | No. of Days on which Rain Fell. | Greatest Rainfall in 24 Hours. |
|---|---|---|---|---|---|---|---|---|
| | | | Highest recorded. | Lowest recorded. | | | | |
| | Feet. | | | | | Miles. | | |
| Colombo ... ... | 40 | 88·31 | 30·072 | 29·607 | 80·7 | 198·2 | 173 | 11·90 |
| Ratnapura ... | 84 | 150·13 | 30·003 | 29·314 | 79·1 | 31·0 | 207 | 11·42 |
| Puttalam... ... | 27 | 46·08 | 30·106 | 29·535 | 79·5 | 208·0 | 77 | 12·06 |
| Anuradhapura | 295 | 54·44 | 29·840 | 29·264 | 80·2 | 54·8 | 104 | 9·32 |
| Mannar ... ... | 12 | 38·24 | 30·103 | 29·588 | 81·7 | 214·7 | 61 | 11·00 |
| Jaffna ... ... | 9 | 43·98 | 30·157 | 29·552 | 81·7 | 216·0 | 74 | 9·92 |
| Trincomalee ... | 12 | 62·74 | 30·062 | 29·402 | 81·2 | 241·7 | 112 | 8·21 |
| Batticaloa ... | 26 | 55·35 | 30·108 | 29·565 | 80·4 | 120·7 | 102 | 10·46 |
| Hambantota ... | 50 | 36·17 | 30·034 | 29·583 | 79·7 | 199·7 | 85 | 5·06 |
| Galle ... ... | 48 | 91·33 | 30·081 | 29·621 | 79·7 | 150·8 | 206 | 7·66 |
| Kandy ... ... | 1654 | 81·55 | 28·426 | 27·975 | 75·3 | 49·5 | 193 | 8·95 |
| Hakgala ... ... | 5581 | 91·12 | 24·725 | 24·205 | 60·8 | 151·4 | 203 | 7·40 |
| Badulla ... ... | 2225 | 79·51 | 27·905 | 27·396 | 73·0 | 47·3 | 111 | 9·46 |
| Vavuniya ... ... | 317 | 59·48 | 29·850 | 29·271 | 80·3 | 78·7 | 100 | 5·40 |
| Kurunegala ... | 381 | 84·30 | ... | ... | 79·6 | 29·6 | 172 | 6·97 |
| Nuwara Eliya . | 6188 | 94·14 | 24·228 | 23·800 | 57·9 | 81·8 | 202 | 9·11 |

F. Lewis.

# APPENDIX IV.

## HISTORY OF CEYLON BOTANY.

*By* G. S. Boulger, F.L.S., F.G.S., *Professor of Botany, City of London College.*

The first serious student of the botany of Ceylon was **Paul Hermann,** born at Halle, in Saxony, June 30th, 1646.* It is related of him that, when a boy of ten, he fell into the water when he was collecting plants and was nearly drowned. He was educated at Wittenberg, Leipsic, and Jena, but graduated in medicine in Padua, in 1670. Through the good offices of Arnold Syen, Professor of Medicine and Botany at Leyden, and annotator of the first volume of Rheede's 'Hortus Malabaricus,' he was introduced to the Governor of the Dutch East India Company, by whom he was appointed 'Ordinary and First Physician' in Ceylon, where he resided from 1672 to 1679. On his voyage out he botanised at the Cape of Good Hope, making large collections, some results of which were embodied in a catalogue published by J. Burmann in his 'Thesaurus Zeylanicus' (1647).

At this period the Dutch held most of the coast towns of Ceylon, having wrested Colombo from the Portuguese only so recently as 1655; but the whole interior still remained under the rule of the native Emperor of Kandy, at this time the powerful Raja Singha, and it is interesting to note that our countryman, Robert Knox,† was undergoing his long captivity in the interior at the very period of Hermann's sojourn at Colombo.‡ Dr. Trimen infers from Hermann's chief herbarium, which is, he says, 'a representative one of the environs of Colombo, that Hermann neither travelled far from the coast nor had the opportunity of penetrating into any tract of untouched forest.' In addition to an herbarium sent to Commelin, Hermann sent specimens from Ceylon to other botanists; but certainly not, as Dr. Trimen imagines (*op. cit.*, pp. 132, 134), to Gronovius, since that botanist was not born until 1690, and was, therefore, only five years old at Hermann's death. Hermann's plants in the Banksian herbarium received from Gronovius must, therefore, have come to the latter indirectly. Hermann's own herbarium of plants, collected either wild or growing in the gardens of the natives, was pasted into three

* Not 1640, as stated in Pritzel's. † *Vide infra*, p. 372.
‡ 'Journ. Linn. Soc.' (Bot.), xxiv. p. 131.

volumes 'in formâ atlanticâ . . . . sine ullo plane ordine, prout forte ad manus venerant.' * Hermann also had about four hundred drawings of plants executed in Ceylon.† On the death of Syen in 1678, Hermann was elected to the Leyden chair, Peter Hotton ‡ acting as *locum tenens* until his return to Europe in August, 1680.

Hermann introduced into the Leyden Botanical Garden more than twice as many plants as his predecessors, Bontius, Clutins, Pavius, Clusins, Vorstins, Schuylins, and Syen, had done in a century, rendering it the richest of the age. § He built hot-houses, established a museum, and visited Germany, France, and England for plants. Possibly while in England he made the acquaintance of that 'Mæcenas of his day,' Dr. Richard Richardson, a letter to whom from him, dated Leyden, 14 December, 1690, is printed in Dawson Turner's privately printed 'Correspondence of Richard Richardson' (Yarmouth, 1835).

Hermann arranged the Leyden garden systematically according to Morison's system, with modifications 'which can scarcely be called an improvement upon it,'|| including, for instance, *Malva* and *Fumaria* in his primary division of 'Gymnosperms.' This system he propounded in 'Flora Lugduno-Batavæ flores, sive enumeratio stirpium horti Lugduno-Batavi methodo naturæ vestigiis insistente dispositarum,' Leyden, 1690, pp. 267, published under the name of Lothar. Zumbach, but undoubtedly Hermann's work, as is testified by Sherard,¶ Linnæus,** Haller, Sprengel, Pritzel, &c. Hermann's classification was defended by his pupil Olans Rudbeck the younger. †† The only work published by Hermann under his own name during his lifetime was 'Horti academici Lugduno-Batavi catalogus . . . . quibus ab anno 1681 ad 1686 hortus fuit instructus, . . . . a nemine hucusque editarum,' Leyden, 1687, pp. 699, 8vo, with copperplate illustrations. A few brief descriptions in this work, with reduced copies of some of the drawings made in Ceylon, is all that he himself printed on Ceylon botany. In 1689 William Sherard ‡‡ published at Amsterdam his 'Schola Botanica,' pp. 390, 12mo, which the British Museum authorities catalogue under Pitton de Tournefort, and Pulteney and Pritzel attribute to a mythical Samuel Wharton or Warton. Its title runs:

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* 'Flora Zeylanica,' pref., p. 17, and 'Musæum Zeylanicum,' pref.

† 'Flora Zeylanica,' pref.

‡ Born at Amsterdam in 1648, this botanist, one of the correspondents of John Ray, succeeded Hermann in 1695, and died in 1709.

§ C. Sprengel, 'Historia Rei Herbariæ,' vol. ii. p. 42.

|| J. Sachs, 'History of Botany' (Eng. ed.), p. 68.

¶ 'Paradisus Batavus,' 1698, preface.

** 'Flora Zeylanica,' "Autores."

†† C. Sprengel, *op. cit.*, p. 44.

‡‡ WILLIAM SHERARD, styled by Boerhaave 'vir scientiâ præstantissimus,' and by Sibthorp, 'botanicorum istius ævi facile princeps,' the pupil of Tournefort, friend of Vaillant, Hermann, Ray, and Sloane, patron of Catesby and Dillenius, and founder of the chair that bears his name at Oxford, was born at Bushby, Leicestershire, and died in London in 1728. A full account of his life, by Mr. B. D. Jackson, appears in the 'Journal of Botany' for 1894, p. 129.

'Schola Botanica; sive Catalogus Plantarum quas ab aliquot Annis in Horto Regio Parisiensi Studiosis indigitavit Jos. Pitton de Tournefort ut et Pauli Hermanni P. P. Paradisi Batavi Prodromus:' it is signed 'S. W. A.' (Sherardus Wilhelmus, Anglus), and the preface is dated London, 1688. The 'Prodromus,' which Linnæus, in the list of authorities prefixed to the 'Flora Zeylanica,' styles 'supposititius,' occupies pp. 301–386, with 4 pp. of addenda. In the last year of his life, Hermann began to print a flora of Leyden. Linnæus* styles this 'Flora Lugduno-Batava, Lugd. 1695, 8vo, semi impressa moritur cum Autore,' but it has no title, consisting of 128 pp. dealing with 'Plantæ Gymnospermæ.'

Hermann died of pneumonia at Leyden in January, 1695. After his death his widow † seems to have intrusted most of his MSS. to Sherard. The first result of this was 'Paradisus Batavus, continens Plus centum Plantas affabrè ære incisis & Descriptionibus illustratis . . . . cui accessit Catalogus Plantarum, quas pro Tomis nondum editis, delineandas curaverat Paulus Hermannus, M.D. . . . . Opus Posthumum edidit William Sherard,' Leyden, 1698, 4to, pp. 262, with 111 plates. Sherard's preface, dated from Geneva, April, 1697, relates the difficulties he met with in reducing the author's papers into order, and gives an account of Hermann's other works. The 'Paradisus' is dedicated to Bishop Compton, and a critical notice of it, sent by Ray to Sloane, is printed in 'The Correspondence of John Ray' (Ray Society, 1848, p. 349). The 'Paradisus' contains descriptions and drawings of Sinhalese plants in addition to those in the 'Horti Lugduno-Batavi Catalogus,' but the drawings being in quarto are reduced from the originals. In 1710 Hermann's 'Materia Medica' ‡ was published under the editorship of J. S. Henniger (Argentor. 4to), subsequent editions by J. Boecler appearing in 1726 and 1729, and one by Strother, London, 1736. In 1711 there appeared 'Musæi Indici catalogus, continens varia exotica animalia, insecta, vegetabilia, mineralia, quæ collegerat,' 8vo, a catalogue of his museum in the Leyden garden; and in 1717 the important little 'Musæum Zeylanicum, sive catalogus plantarum in Zeylana sponte nascentium observatarum et descriptarum a viro celeberrimo, Paulo Hermanno . . . . ,' Leyden, 1717, 8vo, pp. 71. In this pamphlet, to which the term 'anonymous,' used by Dr. Trimen (*loc. cit.* p. 129), seems scarcely applicable, the plants appear under their Sinhalese names, but references to Boccone, Acosta, C. Bauhin, the 'Paradisus Batavus,' and 'Hortus Lugd.-Bat.,' are added. In the prefaee the editor, who is well known to have been Sherard, states that, in addition to the three volumes of the herbarium, a fourth would be made up, and pp. 39–71 are occupied by a list of 'aliæ

* 'Flora Zeylanica,' "Autores," and 'Bibliotheca Botanica,' ed. 2, p. 58.

† Anna Gertrude Stomphius, daughter of a pastor of Colombo. Hermann's first wife, Isabella Borman, died within a year of their marriage.

‡ 'Cynosura materiæ medicæ.'

plantæ chartis non agglutinatæ.' A reprint of the 'Musæum' appeared in 1726.

Meanwhile Sherard, anxious to continue Hermann's work in Ceylon, recommended John Hartog, who was born and trained in the Leyden garden, to proceed thither. At the Cape Hartog collected many rarities, but was only saved from being torn in pieces by a lion by the timely bullet ('globus missilis') of his servant's gun. His Cape plants, with those of Oldenland, form the second of the two catalogues bound up with Burmann's 'Thesaurus.' Though after being some time in Ceylon he sent to Voss the 'complete' herbarium which Burmann used for his 'Thesaurus,' Hartog seems not to have long survived. Meanwhile Hermann's own herbarium, upon which the 'Musæum' had been based, appears to have been completely lost sight of till the year 1744, when August Günther, Apothecary-Royal at Copenhagen,* sent to Linnæus at Upsala to be named a collection of Indian plants in five volumes, one being a volume of drawings.

From Günther, Hermann's herbarium 'passed into the possession of Count A. G. Moltke,† at whose death it was purchased by Prof. Treschow, of Copenhagen. The latter sold it to Sir Joseph Banks for 75*l.*,‡ and it passed, with the rest of the Banksian collection, into the keeping of the Trustees of the British Museum in 1827. Since it came into the hands of Sir J. Banks, it has been frequently the object of examination. Especially it was very thoroughly gone over by Dryander, who, in a copy of the "Flora Zeylanica" (now in the Botanical Department of the British Museum), entered against each species references to the volumes and folios of the herbarium where the corresponding specimens are to be found. . . . . Robert Brown, Dryander's successor in the charge of the Banksian collections, was also in the habit of consulting the herbarium, and frequently quotes its specimens. Dr. Wight was unfortunately able to consult it only to a limited extent.§ . . . . W. Ferguson, F.L.S., of Colombo, when on a visit to England . . . . carefully examined the whole collection.'‖ The results of Dr. Trimen's own detailed work in 1886 are embodied in the paper from the introduction to which this passage is taken. He says of the herbarium (*loc. cit.*, p. 132), 'The specimens, considering their age and the vicissitudes the collection has sustained, are in very fair condition; and, in the few cases where identification is uncertain, this arises more from the material being originally scanty or imperfect than from any deterioration

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* There are five letters from Günther to Linnæus in the correspondence of the great naturalist preserved in the library of the Linnean Society. The dates of these are from 1744 to 1749. Two are written in Swedish and three in Latin.

† Rottböll, 'Descriptiones et Icones rar. pl.' (1786), p. 49.

‡ MS. note by Dryander in the Herbarium.

§ Preface to 'Prodromus Floræ Indiæ Orientalis,' p. x.

‖ Trimen, *loc. cit.*, pp. 130, 131.

since its collection. A considerable proportion of the plants (about fifty) are exotics, and gathered, doubtless, from gardens. It is of interest to see at what an early date many of these were already common in Ceylon. Most are, of course, Old World plants, but a dozen or more are of American origin, as the Custard Apple, Guava, Cashew-nut, Capsicum, and Cotton. But, besides these cultivated exotics, the list will be found to contain two or three species from the Cape.' Of these errors, arising from Sherard's fourth volume, those originally 'non-agglutinatæ,' he specifies Linnæus's *Bobartia indica*, which is *B. spathacea*, Ker, and *Gnaphalium indicum*, L., which is *Amphidoxa gnaphalodes*, DC.

**Carl von Linné.** As stated under the notice of Hermann's life and labours (ante, p. 370), the herbarium and collections of drawings of the latter were sent to Linnæus to be named. The great botanist was not long in discovering what a treasure he had in his hands.* In his own words, 'Hanc dum evolvo, examino et inquiro, observo plantas hasce per tres primos tomos, in singulis paginis totidem, easdem, eodemque ordini esse dispositas, quo in Hermanni 'Museo Zeylanico' continentur a p. 1 ad 39; accedebat quod *Icones*, quas quintus tomus continet, essent ipsius Hermanni . . . . ut dubium nullum sit, quin hæc collectio fuerit ipsissima Hermanni. Quartus tomus continebat plantas Capenses et Zeylanicas mixtas' †—Sherard's 'non agglutinatæ' in fact. The delight with which Linnæus at once set to work at the examination of his treasure is well expressed in the following passage from his dedication of the 'Flora Zeylanica' to Günther: 'Gratulor orbi erudito, quod hic Thesaurus, qui per 50 annos fuerat suppressus, indignorum manibus versatus, & in Barbarorum hominum scriniis sepultus, rerum vicissitudine iterum emerserit & ab interitu fuerit vindicatus. Est hoc opus Herbarium Zeylanicum, quondam a Principe Botanicorum, Paulo Hermanno, lectum in Zeylona multis itineribus, periculis, laboribus, curis, nec sine Fœderati Belgii maximis sumtibus.' ‡

The 'Flora' was published at Stockholm,§ in 1747, its full title being 'Flora Zeylanica sistens plantas indicas Zeylonæ insulæ quæ olim 1670–1677 lectæ fuere a Paulo Hermanno, Prof. Bot. Leydensi; demum post 70 annos ab Augusto Günthero, Pharmacop. Haffniensi, orbi redditæ,' Holmiæ, 1747, 8vo, pp. 28, 240, and 20 pp. of index, with 4 folding plates. In it 'Linnæus has classified all the plants in the herbarium which he could determine (429 in number) under their genera; and these are duly arranged in accordance with his sexual system. Under each species he refers to the names in the "Musæum," and at the end he gives lists of those names (228 in number) which he was unable (in nearly all cases from the absence

* Trimen, 'Journ. Linn. Soc.' (Bot.), xxiv. p. 129.

† 'Flora Zeylanica,' preface, pp. 17, 18.

‡ *Id.*, dedication.

§ Not at Amsterdam, as stated by Mr. Jackson, 'Guide to the Literature of Botany,' p. 395.

of specimens) to refer to any genus. The whole number of plants enumerated is thus 657. In the herbarium itself he has added to Hermann's labels a reference to the number of the species in his own copy of the "Flora Zeylanica;"' and in his own copy of the 'Musæum Zeylanicum,' now in the Linnean Society's library, 'he has entered in the margin against each name the genus to which he referred it.'* 'At this period of Linnæus's career he had not yet initiated his binomial system of nomenclature; thus no species in the "Flora Zeylanica" are *named* in the modern sense, but are only referred to their Linnean genera. When, however, in 1753, that really epoch-making book, the "Species Plantarum," was published, in which specific names were systematically employed, Linnæus was careful to quote under them the numbers of the "Fl. Zeylan.," and thus the specimens of Hermann's herbarium become types for many of Linnæus's species. It is this, of course, which gives to this interesting collection its great scientific value, and renders it an important supplement to the herbarium of Linnæus himself . . . .; especially as the large majority of the species in Hermann's herbarium are unrepresented in the latter.'†

A second edition of the 'Flora' appeared in 1748, to some copies of which is appended 'Nova genera plantarum zeylanicarum nuper edita . . . . per C. M. Dassow, pp. 1–14, with an index.' This is taken from the 'Amœnitates Academicæ,' vol. i., No. 13, and is, no doubt, Linnæus's own work. The forty-three new genera here described were afterwards incorporated into the fifth edition of the 'Genera Plantarum,' published in 1754;‡ but Dr. Trimen does not refer to them in the paper from which we have been quoting.

**Robert Knox,** the first Englishman to publish an account of Ceylon, was born in 1640 or 1641, being the son of Robert Knox, a Scotsman, a commander in the East India Company's navy, and a cousin to John Strype, the antiquary. Knox was brought up at Wimbledon, Surrey, where his mother died about 1655, and in January, 1657, he sailed with his father to Madras. On the homeward voyage, in November, 1659, they were driven by stress of weather into Cottier (Kottiyar) Bay, Ceylon, where Knox, his father, and fourteen others were made prisoners. The father died in captivity in 1660; but Knox remained a prisoner at large for nearly twenty years, making several unsuccessful attempts to escape, and supporting himself by knitting caps, lending out corn and rice, and hawking goods. In September, 1679, with his faithful comrade, Stephen Rutland, he escaped to the Dutch settlement of Aripo, on the north-west coast, whence he was sent to Batavia, and so to England. The East India Company took him into their service as mate: he rose to be commander, and died in London, July, 1720. His narrative. written with the help of Robert Hooke, is entitled

* Trimen, *loc. cit.*, p. 130.

† *Ibid.*

‡ Pulteney, 'General View of the Writings of Linnæus' (1781), p. 232.

'An Historical Relation of the Island of Ceylon in the East Indies; together with an Account of the detaining in Captivity the Author and divers other Englishmen now living there, and of the Author's Miraculous Escape. Illustrated with figures and a map of the island.' London, 1681, fol. It is both trustworthy and entertaining, and has been translated into French, Dutch, and German. It contains an intelligent account of the trees of the island. Linnæus named the Rubiaceous genus *Knoxia* in his honour.

**Johann Gerhard König,** a pupil of the illustrious author of the 'Flora Zeylanica,' collected in the island in 1777, 1780, and 1781. König was born at Courland about 1728. He visited Iceland in 1765; but from 1768 was in the East Indies until his death at Jagannathpur in 1785. He was at first physician to the Danish settlement in the Carnatic, and subsequently naturalist to the Nabob of Arcot, and, in 1778, joined the Madras establishment of the East India Company. He also collected in Siam and Malacca, and bequeathed his plants and MSS. to Banks; but his Ceylon journal was unfortunately lost.* There is a short account of König's visits to Ceylon in August Hennings's 'Geschichte des Carnatiks,' Hamburg and Kiel, 1785, pp. 289–311. König's name has been twice commemorated; by Tournefort for a genus of *Malvaceæ* prenamed *Dombeya*, and by Linnæus for an arctic plant now merged in *Polygonum*.

**Carl Peter Thunberg,** the pupil and successor of Linnæus, was in Ceylon from August, 1777, to February, 1778.† He was born in 1743, graduated as M.D. at Upsala in 1770, visited the Cape in 1771, Java and Japan (1774–1777), his visit to Ceylon being on his return journey. He became professor at Upsala in 1784, and died in 1828.

From the British seizure of the Dutch possessions in 1796, when they were annexed to the presidency of Madras, until 1801, when Ceylon became a Crown colony, nothing seems to have been done for botany; but, before the deposition of the King of Kandy in 1815, **William Kerr,** a Kew gardener and collector, who had previously been in Java, Canton, and the Philippines, was appointed, by Sir Joseph Banks, Superintendent of the Botanical Garden at Slave Island, Colombo. He was, in fact, appointed in 1812, but died in 1814.‡

In 1817, **Alexander Moon,** a Scotsman, was appointed, by Sir Joseph Banks, Superintendent of the Gardens. He collected at Gibraltar and on the Barbary coast on the way out, and formed an extensive herbarium at Peradeniya. In 1824, he published 'Indigenous and Exotic Plants growing in Ceylon,' Colombo, 4to,

* Britten and Boulger, 'Biogr. Index of Brit. and Irish Botanists, Supplement,' p. 208; Roxburgh, 'Coromandel Plants,' vol. i., pref., pp. ii. iii. vi.

† 'Travels,' vol. iv. (1795) pp. 170–265.

‡ His name is commemorated by the genus *Kerria*, DC. See Britten and Boulger, *op. cit.*, p. 97.

a somewhat unsatisfactory performance.* Moon died in 1825. There are plants collected by him in the Kew herbarium, and some of his drawings are in the Botanical Department of the British Museum. Arnott dedicated to him the genus *Moonia*, now sunk in *Chrysogonum*, L.

**James Macrae,** who had been employed in the garden at St. Vincent in 1823, and had subsequently collected for the Horticultural Society in the Pacific, in Chili, and Bengal, was appointed Superintendent in 1827, but at his death, in 1830,† had not, apparently, much advanced the cause of botany in Ceylon; nor, in fact, was much likely to be done until a more highly educated type of man was appointed to the post.

Meanwhile, amateur work was doing something. Colonel, afterwards General, **James Thomas Walker** and his wife, **Mrs. A. W. Walker** *née* Paton, collected in the island from 1830 to 1840. A description of their ascent of Adam's Peak appears in the 'Companion to the Botanical Magazine,' vol. i. (1835), p. 3; and a 'Tour in Ceylon,' by Mrs Walker, in Hooker's 'Journal of Botany,' 1840, p. 223. General and Mrs. Walker's plants formed part of Sir W. J. Hooker's herbarium, now at Kew, and also did those of his friend, **Dr. Charles Millett,** who, about 1834, collected in Southern China, in Ceylon, and on the Malabar coast,‡ and those of Major, afterwards Lieut.-Colonel, Champion.

**Dr. Robert Wight, F.R.S.,** born in East Lothian, 1796, graduated M.D. in Edinburgh in 1818. Entering the East India Company's service as Assistant-Surgeon in the army, he was from 1826 to 1828 stationed at Madras, and from 1836–1850 was Superintendent of the efforts of the Government for the improvement of cotton cultivation in the peninsula. During three years' furlough in England (1831–1834), he began, in conjunction with Dr. Walker-Arnott, the publication of his botanical materials, especially in the 'Prodromus Floræ Peninsulæ Indiæ Orientalis.' In 1836 a severe attack of fever, caught in Tinnevelly, obliged him to pay a short visit to Ceylon to recruit, and whilst there he collected extensively in company with Colonel and Mrs. Walker, in compliment to the latter of whom he named the genus *Patonia*, now merged in *Xylopia*, L. It was during this furlough abovementioned, that Dr. Wight, when staying with his friend, Sir W. Hooker, at Glasgow, acquired the art of lithography, and providing himself, at his own expense, with printing-press stones and all necessary materials; he on his return to India introduced the art into the Madras Presidency, and commenced his 'Illustrations of Indian Botany,' with 182 plates, which was followed by the 'Icones

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* Sir J. Emerson Tennent, 'Ceylon,' 3rd ed., vol. i. p. 84.

† There seems to have been a fate against any commemoration of Macrae's name: *Macræa*, Lindl., is *Viviania*, Cav.; *Macræa*, Wight, *Phyllanthus*, L.; and *Macræa*, Hook. fil., *Lipochæta*, DC.

‡ The genus *Millettia*, Wight and Arnott, was named after him.

Plantarum Indiæ Orientalis.' This last great work, commenced in 1840 and concluded in six volumes in 1853, containing 2100 excellent quarto plates, has done more for the illustration of the Flora of Ceylon than all others hitherto published. In 1853, after a residence of upwards of thirty years in India, during which he had published in the above-mentioned and other works nearly 3000 species of Indian (including Ceylon) plants, he retired from the service, returned to England, and took up his abode at Grazeley Lodge, near Reading, where he died, May 26th, 1872. His collection he presented to the herbarium of the Royal Gardens, Kew. *Wightia gigantea*, a remarkable Nepalese scandent tree, of the Order *Scrophularineæ*, was dedicated to his services by Wallich.

**John George Champion, F.L.S.,** was born about 1815, and in 1831 was gazetted as ensign in the 95th. He embarked for active service as captain in 1838, was stationed for some time in the Ionian Islands, where he collected insects diligently, and subsequently in Ceylon, where he took up botany under Gardner, remaining there until 1848. He then proceeded to Hongkong, whence he returned to England in 1850, bringing with him a fine collection of plants from that island, which were described by Bentham, and afterwards incorporated in the 'Flora Hongkongensis.' In 1853 Champion went with his regiment to the Crimea. Having been wounded at the battle of Inkermann, and taken to the hospital at Scutari, he was gazetted lieutenant-colonel, but died November 30th, 1854. He is commemorated by the Sinhalese genus *Championia*, Gardner.

Almost coincident with Colonel Champion's arrival in the island in a military capacity was that of another energetic amateur, who came as a civilian, **William Ferguson,** who, born in 1820, entered the Ceylon Civil Service in 1839, and, with the exception of short furloughs, remained there until his death, which took place at Colombo on July 31st, 1887. He devoted his leisure to botany and entomology, and his knowledge of the plants and insects of Ceylon became most intimate. Many of his papers appeared in the 'Ceylon Observer' and in the 'Tropical Agriculturist.' He published, at Colombo, 'The Scripture Botany of Ceylon,' n.d.; 'Description of the Palmyra Palm (*Borassus flabelliformis*, L.),' 1850; 'The Timber Trees of Ceylon,' 1863; 'Notes on Ceylon Ferns,' 1880; and, in the 'Journal' of the Ceylon branch of the Royal Asiatic Society, an 'Enumeration of Ceylon Grasses, with notes,' 1880. He is commemorated by the monotypic genus *Fergusonia*, Hook. fil., in the Order *Rubiaceæ*.

A new era seemed about to dawn for Ceylon botany when, in 1843, **Dr. George Gardner** was, on the recommendation of Sir William Hooker, appointed Superintendent of the Botanical Garden of Peradeniya. Born in Glasgow in 1812, he had studied medicine in the university of that city, graduating M.D. in 1835. Having

conceived a strong desire for botanical travel, with the assistance of his teacher, Sir W. J. Hooker, he started on a collecting expedition to Brazil, from which country he sent home 60,000 specimens, representing 3000 species, while his own collection comprised 6000 species of flowering plants alone, and he brought back with him to England, in 1841, a large number of living plants. His journal appeared in the 'Companion to the Botanical Magazine' and in the 'Annals of Natural History,' and the descriptions of his new genera in the 'Journal of Botany' A more detailed account of this journey, having been prepared by him on the voyage out to Ceylon, was published in 1846 as 'Travels in the interior of Brazil.' Gardner showed his energy by issuing, four months after his arrival in Ceylon, the first of those reports on the Garden which have since then been continued annually. In 1845 he visited Madras, and botanised in the Neilgherry Hills with Wight, in conjunction with whom and Dr. M'Clelland he became editor of the 'Calcutta Journal of Natural History.' In this journal he was writing 'Contributions towards a Flora of Ceylon' during the last year of his life, and he also drew up, in 1848, 'Some Remarks on the Flora of Ceylon,' which were printed in the appendix to Lee's translation of Ribeyro; but his premature death from apoplexy, at Nuwara Eliya, on March 10th, 1849, destroyed the hopes that had been built upon his great capacity. Gardner's herbarium, comprising 14,000 specimens, was mostly purchased by the British Museum. His name is commemorated by the Leguminous genus *Gardneria*, Wallich.

On Gardner's death his place was taken, also on the recommendation of Sir William Hooker, by a botanist who had already achieved a singular reputation, **George Henry Kendrick Thwaites, F.R.S.,** who probably has done more for our scientific and practical knowledge of the vegetable products of Ceylon than any one man. Thwaites was born at Bristol in 1811, and began life as an accountant, devoting his leisure impartially to entomology and microscopical botany, chiefly that of the cryptogams. His earliest paper was 'Notes on a Species of *Stylops*' (an insect parasitic on the bee), written in 1838, though not published till 1846 ('Trans. Entomol. Soc.,' vol. iii.), and he never abandoned entomology. He was so recognised as a competent biologist as to be engaged by his fellow townsman, Dr. W. B. Carpenter, to revise the second edition of his 'General Physiology' in 1841. In conjunction with Christopher Edmund Broome, he investigated the structure of truffles: his earliest botanical note, contributed to the 'Phytologist' in 1841, was on the occurrence of *Asplenium lanceolatum* near Bristol; and his first paper of importance was one 'On the Occurrence of Tetraspores in Algæ' in the 'Annals and Magazine of Natural History' for 1846, which was followed by others, mostly phycological, in the same magazine. An acute observer and expert microscopist,

specially skilful in preparing microscopic objects, at a time when students of the structure of cryptogams were so few in England that many of his discoveries were overlooked and subsequently attributed to later Continental workers, his most important observations at this period were those on the conjugation and algal nature of diatoms—organisms which had till then been generally regarded as animals. This discovery led Montagne to dedicate to him in 1845 the algal genus *Thwaitesia.* He worked also at desmids and lichens; but that he did not confine his attention to cryptogams is shown by his communicating a list of the flowering plants within a ten-mile radius of Bristol to Hewett Watson for his 'Topographical Botany.' He was also one of the early contributors to the 'Gardeners' Chronicle,' one of his first discoveries with a direct bearing upon horticulture being the raising of two distinct varieties of *Fuchsia* from the two embryos in a single seed. In 1846 he became lecturer on botany at the British School of Pharmacy and Medical School, and in the following year was, like Watson, an unsuccessful candidate for a natural history chair in one of the new Queen's Colleges in Ireland.

Directly he reached Ceylon, which he never left till his death, he devoted himself to the investigation of the flora of the island, and for fifteen years he almost ignored his favourite Cryptogamia. Until 1857 his duties were mainly scientific, and between 1852 and 1856 he contributed numerous descriptions, with drawings and analyses, of Sinhalese phanerogams to Hooker's 'Journal of Botany,' including twenty-five new genera. In 1857 the title of his office was changed from Superintendent to Director, and he became yearly more and more engrossed by the less congenial duties of investigating the application of botany to tropical agriculture. It is hardly surprising that the lay mind, becoming aware of the absence of any adequate enumeration of Ceylon plants, and unable to appreciate the thoroughness of Thwaites's method, should grumble. Thus we find Sir J. Emerson Tennent writing in 1858: 'Up to the present time the botany of Ceylon has been imperfectly submitted to scientific scrutiny. . . . . It may be mentioned as a fact which is much to be regretted, that, although botanists have been appointed to the superintendence of the Botanic Gardens at Kandy, information regarding the vegetation of the island is scarcely obtainable without extreme trouble and reference to papers scattered through innumerable periodicals. That the majority of Ceylon plants are already known to science is owing to the coincidence of their being also natives of India, whence they have been described; but there has been no recent attempt on the part of colonial or European botanists even to throw into a useful form the already published descriptions of the commoner plants of the island. Such a work would be the first step to a Sinhalese flora. The preparation of such a compendium would seem to belong to the duties of the colonial botanist, and as such it was an object of especial

solicitude to the late Superintendent, Dr. Gardner. But the heterogeneous duties imposed upon the person holding his office . . . . have hitherto been insuperable obstacles to the attainment of this object. . . . .

'P.S.—Since the foregoing passage was written, Mr. Thwaites has announced the early publication of a new work on Ceylon plants, to be entitled "Enumeratio Plantarum Zeylaniæ; with Descriptions of the New and Little-known Genera and Species;" and observations on their habits, uses, &c. In the identification of the species, Mr. Thwaites is to be assisted by Dr. Hooker, F.R.S., and from their conjoint labours we may at last hope for a production worthy of the subject.'*

Thwaites, in fact, began the printing of the 'Enumeratio,' his only independent book, in the very year, 1858, in which Tennent wrote, the work being issued in five fasciculi, between 1859 and 1864, and containing in all 483 pages, 8vo. It contains descriptions in Latin of many new species, and Thwaites acknowledges the assistance he had received in the identification of the species, and in the synonymy, from Dr. (now Sir Joseph) Hooker. On the completion of the work, he was elected a Fellow of the Royal Society, and received the degree of Doctor of Philosophy from the Imperial Leopoldo-Carolinian Academy, whilst, in 1867, the beautiful genus of Sinhalese climbing plants, *Kendrickia*, Hook. fil., was dedicated to him; but he never himself considered his work as more than a prodromus to a complete flora, or a catalogue to the extensive sets of exsiccatæ which he distributed. It is worthy of note that in the preface to the 'Enumeratio,' dated 1864, Thwaites announces his adhesion to the Darwinian view of the nature of species. In 1860, Thwaites had established the cinchona nurseries at Hakgala, the subsequent success of the cultivation of these plants in Ceylon being largely due to his efforts. His successive annual official reports deal also with the cultivation of vanilla, tea, cardamoms, cacao, and Liberian coffee. In 1869, he sent to the Rev. M. J. Berkeley the first specimens of the coffee-leaf fungus (*Hemileia vastatrix*); and his reports from 1871 to 1880 —in some of which he was assisted by Dr. Morris, C.M.G., F.L.S.,† and Dr. H. Marshall Ward, F.R.S.‡ —deal with it and the suggested preventives, repudiating, in face of much adverse popular opinion, any hope of external cures. After the completion of the 'Enumeratio,' Thwaites returned to the study of cryptogams, sending home more than 1200 fungi, which were described by Messrs. Berkeley and Broome,§ besides mosses, which were published by Mr. Mitten in 1872, and lichens, some of which were described by the Rev. W. A. Leighton in 1870. Thwaites's health began to fail in 1867; and, Dr. Trimen having arrived in

* Sir J. Emerson Tennent, 'Ceylon,' 3rd edition (1859), vol. i. pp. 84, 85.
† Now Commissioner of Agriculture in the West Indies.
‡ Now Professor of Botany in the University of Cambridge.
§ Journ. Linn. Soc. (Bot.), xi., 1871, pp. 494 *et seq.*

1879 to take his place, he in the following year retired on a well-earned pension, and purchased the pretty bungalow named 'Fairieland,' above Kandy. While in Kandy, on his way to the seaside, Thwaites died, September 11th, 1882. He had been an F.L.S. since 1854, and a C.M.G. from 1878. A portrait of him accompanies a brief memoir in the 'Gardeners' Chronicle' for 1874, vol. i. p. 438.

Among those who assisted Thwaites, we can only mention three other names, those of Harmanis De Alwis, George Wall, and the Rev. S. Owen Glenie. **Harmanis de Alwis Seneviratne** joined the staff of the Ceylon Garden in 1818 as a writer under Moon (the second Superintendent) at the old Gardens in Slave Island, Colombo, and at Kalutara, assisting him in the preparation of the 'Catalogue of Ceylon Plants' (1824). Perceiving De Alwis's aptitude for drawing, Moon had him taught at his own expense. 'In 1821, the Gardens were moved to Peradeniya, and two years after, in 1823, De Alwis was appointed draftsman, a post he continued to hold for thirty-eight years. He at once commenced, under Moon's direction, the coloured drawings of Ceylon plants which have now become so large and valuable a series. So well did he do his work, that Governor Barnes, in 1831, conferred on him the native rank of Muhandiram.' When, in 1836, Wight visited Ceylon, he was so interested in De Alwis's drawings, that, in 1839, he had him for three months at Madras, to learn floral dissection and draw some of the plates of the 'Icones Plantarum Indiæ Orientalis.' 'When Gardner arrived as Superintendent of the Gardens, he found already a good series of drawings, which, under his auspices, rapidly increased in number and aceuracy, it being Gardner's practice for the artist to accompany him in all his botanical tours. Dr. Thwaites followed the same plan, and, in the preface to his "Enumeratio," acknowledges De Alwis's "intelligent and hearty co-operation" in the work. In 1854, an assistant draftsman was also at work in the person of one of the sons of De Alwis, and, in this year, the rank of Mudaliyar was bestowed on him by Governor Anderson. In 1861 he retired on full pension, which he lived to enjoy for thirty-three years in the complete possession of his memory and his senses, with the exception of failing eyesight. De Alwis died at Peradeniya, June 10th, 1894, at a very advanced age. His name is commemorated in a very curious and minute leafless orchid, which he was the first to discover, and which was named after him in 1859, by Dr. Lindley, *Tæniophyllum Alwisii.* Dr. Lindley also named another little orchid *Alwisia tenuis.**

**George Wall, F.L.S.,** born about 1821, went to Ceylon in 1846, where, as a leading merchant, planter, newspaper editor, and member of the legislative Council, he occupied a prominent position. He was an intimate friend of Thwaites, and took

* H. Trimen, 'Journ. Bot.,' 1894, pp. 255–6.

up the study of ferns with an enthusiasm that characterised all his actions. He formed an extensive herbarium of the ferns of the world; and, in 1874, he arranged the large collection of exotic species in the Peradeniya herbarium, to which he added from his own collection. He was the author of two privately printed pamphlets on the ferns of Ceylon, 'A Catalogue of the Ferns indigenous to Ceylon, with Notes by G. W.,' London, 1873, 4to, and a Check List, printed in 1879. He became a Fellow of the Linnean Society in 1872. He died at St. Thomas's Home, London, December 18th, 1894, a few days after his arrival in England from Ceylon. His name is commemorated in *Trichomanes Wallii*, Thw., described in the 'Journal of Botany' for 1885, p. 274, and distributed as C. P. 3989.*

The **Rev. S. Owen Glenie** was Colonial Chaplain at Trincomalee, and collected for Thwaites. He became a Fellow of the Linnean Society in 1863, and the monotypic Sinhalese genus of *Sapindaceæ Gleniea*, Hook. fil., is dedicated to him.†

Mention should perhaps here be made of a German descriptive work by Baron Eugen von Ransonnet-Villez, entitled 'Ceylon. Skizzen . . . . seines . . . . Pflanzenlebens,' &c., Brunswick, 1868, folio, of which an English version appeared in the same year with the title, 'Sketches of the . . . . vegetation . . . . of Ceylon.' This is a narrative of travel, including a visit to Thwaites at Peradeniya, illustrated by twenty-six large drawings lithographed by the author, about half of which represent the vegetation of the island.

**Henry Trimen** was born in Paddington, October 26th, 1843. While still at King's College School he began to form an herbarium, and in 1860 entered the medical school of the College. After spending one winter at Edinburgh University, he graduated as M.B with honours, at the University of London in 1865. Shortly afterwards he acted as medical officer in the Strand district, London, during an epidemic of cholera, but his inclinations were obviously towards botany rather than medicine. He had become a member of the Botanical Society of Edinburgh in 1864, and in London took an active part in the Society of Amateur Botanists and the Botanical Exchange Club. From 1866 to 1869 he was engaged, in conjunction with Mr. (now Sir William) Thiselton Dyer, in the preparation of the 'Flora of Middlesex,' a work which ever since its publication in the latter year has been regarded in England as the model for county floras. Devoted from the first to the study of critical groups of plants, such as *Rumex* and *Polygonum*, he, in the year in which the 'Flora' was published, added to the British list *Wolffia arrhiza*, the smallest of flowering plants, which happens to be also a native of Ceylon. In the same year he became an assistant in the Botanical Department of the British Museum,

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* 'Journ. Bot.,' 1895, p. 63.
† Thwaites's 'Enumeratio,' p. vii.

and, after having for some time aided Dr. Seemann with the 'Journal of Botany,' became its assistant editor in 1870, and on Seemann's death, in the following year, succeeded him as editor. From 1875 to 1880 he issued, in conjunction with the late Prof. Robert Bentley, his second important work, 'Medicinal Plants,' which appeared in forty-two parts, and contains coloured figures of most of the species in the Pharmacopœia. For some years Trimen also acted as lecturer on botany at St. Mary's Hospital.

The zeal with which, on his appointment as Director at Peradeniya in 1879, he took up Thwaites's work was seen in the thorough rearrangement of the plants in the Gardens in scientific order, in much work at economic botany, especially quinology, recorded in his annual official reports, and in a diligent exploration of the island for materials for the present work. He published 'Hortus Zeylanicus: A . . . . List of the Plants . . . . in the Royal Botanic Gardens, Peradeniya,' in 1888, a 'Catalogue of the Library . . . .,' in 1889, and a 'Hand-Guide to the . . . . Gardens,' in 1890, of which the last-named reached a fourth edition in 1894, whilst reference has also been made to his careful work upon Hermann's herbarium whilst in England in 1886. The climate of Ceylon, however, seems to have proved fatal to him. He aged prematurely, became totally deaf, and was partially paralysed; but, after being again in England during 1895, he insisted on returning to Ceylon, hoping to finish the 'Hand-book,' the publication of which had begun in 1893. Trimen died at Kandy, October 16th, 1896, and was buried near his predecessor in the Mahaiyawa Cemetery. His name was given by Dr. King, of Calcutta, to the magnificent Sinhalese banyan, *Ficus Trimeni*. The memoir by Mr. James Britten in the 'Journal of Botany' for 1896 (pp. 489–494), from which most of the above is taken, is accompanied by a portrait from a photograph, but his best memorial in the history of botany in Ceylon is undoubtedly the present work, though he did not live to complete it.

G. S. Boulger.

# ADDITIONS AND CORRECTIONS, PARTS I.–V.

*For further corrections to Parts I. and II. see at commencement of Part II. and conclusion of Part III.*

## PART I.

Page 47, after description of **Cyclea Burmanni**, *read*, 'The pulped leaves render water ropy and gelatinous, hence the plant is used as a remedy for cough, kési,=phlegm.'—J. C. W.*

Page 55, line 3, *read* '*Capparis Moonii* extends into the Montane zone.'—J. C. W.

Page 71, line 22, for '*S. Arnottianus*,' *read* '*Phoberos Arnottianus*.'

Page 87, line 9, delete 'erect' before 'annual,' *and insert* 'or procumbent' before 'very slender'; line 15, after 'obtuse' *read* 'or acute.'—J. C. W.

Page 126, **Sunaptea scabriuscula,** Trim.; Brandis (Journ. Linn. Soc. xxxi. 114) refers this to the genus *Cotylelobium*, Pierre, as *C. scabriusculum*, adding as a synonym *Dyerella scabriuscula*, Heim, Recherch. Dipterocarp. 123.

Page 127 **S. (?) disticha,** *Trim.*; Brandis, l. c. 53 refers this to *Doona*, as *D. disticha*, Pierre Fl. For. Cochin. fasc. 15 (1890) t. 237 in obs.

Page 128, **Vatica Roxburghiana,** *Bl.;* Brandis, l. c. 119, identifies this as *V. chinensis* Linn. Mant. (1771) 242, Smith Pl. Ic. (1789) t. 36.

Page 133, **Stemonoporus acuminatus,** *Bedd.;* Brandis, l. c. 139, adds to the synonymy of this *Vesquella acuminata*, Heim, Recherch. Dipterocarp. 90, and *Sunapteopsis jucunda*, Heim, l. c. 92.

Page 136, **S. reticulatus,** *Thw.;* Brandis, l. c., adds as a synonym *Kunckelia reticulata*, Heim, l. c. 92

Page 136, **S. nitidus,** *Thw.;* Brandis, l. c. adds as a synonym *Doona nitida*, Heim, l. c. 72.

Page 137, at end of genus add :—

14. **Stemonoporus Lewisianus,** *Trimen MSS.*

Branches slender, bark dark brown; branchlets, petioles, and infl. minutely furfuraceously pubescent; l. rather scattered, 2–3 in. long by 1–1½ in. broad, ovate or oblong, subacute or obtusely acuminate, quite entire, base rounded, rigidly coriaceous and reddish or yellowish-brown when dry, smooth, somewhat shining above, with depressed midrib and obscure venation, beneath pale

* The initials, J. C. W., follow notes kindly sent me by J. C. Willis, Esq., M.A., F.L.S., Director of the Royal Botanic Gardens, Peradeniya.

ashy, obscurely puberulous, midrib slender, veins very many, spreading, close-set, reticulate interspaces; racemes axillary and terminal, 2–4 in. long, erect, lax.-fld.; fl. subsecund, nodding, pedicels $\frac{1}{6}$–$\frac{1}{4}$ in. long, buds (near expansion) $\frac{1}{4}$ in. long, ovoid; cal.-tube short, lobes ovate, obtuse; petals orbicular, thick; stam. 25, fil. very short, united at the very base, anth. linear, rather broader downwards, connective terminating in a subulate point half as long as the cells; ov. hemispheric, rough, style very slender, flexuous; very young, fr. globose, roughly minutely tubercled, seated in the rather unequal spreading cal.-lobes.

Hunawal Kande, near Pelmadulla (F. C. Lewis, January, 1893).

From the above description it is evident that, if this species is to be retained in the genus *Stemonoporus*, the generic character of the latter must be modified to include a plant with a long subulate process terminating the anther.

15. **Stemonoporus** (?) **revolutus,** *Trimen MSS.*

Branches very robust, covered with iron-grey bark; l. crowded, imbricating towards the ends of the branchlets, $\frac{1}{2}$–2 in. long by 1–1$\frac{1}{2}$ in. broad, obovate or obovate-oblong, tip rounded, emarginate or retuse, base rounded, rigidly coriaceous, sides revolute when dry, quite entire, smooth above with obscure midrib and veins, beneath pale, with a prominent midrib, and 7–10 pairs of spreading, arched, slender veins, venules minutely reticulate, petiole $\frac{1}{3}$–$\frac{1}{2}$ in. long, stout; stipules 0.

Kukule Korale, at about 3000 ft. elevation (F. C. Lewis, January, 1893).

The specimens having neither fl. nor fr., the genus is doubtful.

Page 174, in key, transpose the leaf characters of G. ORIENTALIS and G. POLYGAMA; the latter has the leaves pubescent, the former glabrous. —J. C. W.

Page 215, line 20, for 3000 *read* 1800.

Page 254, line 3, for 'Bot' *read* 'Bat.'

Page 254, in character of *Olacineæ delete* 'or imbricate.' The petals are valvate in all the Ceylon genera.

Page 308, S. THWAITESII, *read* 'fr. usually of a single carpel, with two abortive ones like warts at its base, about 1 in. long, ovoid, obtuse, densely puberulous, pale ochre-yellow; pericarp thin, tough; seed enveloped in the fleshy aril.'—J. C. W.

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## PART II.

Page 32, line 16, after children, *insert* 'Largely used in Jaffna as a manure for tobacco, a moderately sized bundle selling for 25 cents; also used as a manure for paddy fields (Captain Walker).'

Page 74, under **V. vexillata**, for '*V. pulneiensis*' *read* *Phaseolus pulneiensis*.

Page 88, **Dalbergia Championii**; Dr. Prain, who has been studying the Indian *Dalbergiæ*, informs me that this is *D. rostrata*, Grah. in Wall. Cat. n. 5867 A (not B, except a few leaves); also that it is *D. Sissoo*, Miq. Fl. Ind. Bat. i. I. 128 (not of Roxb.), and *D. Pseudo-Sissoo*, Miq. l. c., the latter being the earliest published name.

Page 107, line 20, after 'Colombo' *read*, 'In 1893 the export from the Manaar district was 288 tons, entirely to Colombo, where it fetches 60–100 rupees per ton. The collectors receive from 1·12 to 1·78 rupees per cent There is a royalty of 2 rupees per ton.—J. C. W.

Page 162, in character of genus **Lumnitzera**, for 'stam. 10,' *read* 'stam. 5–10,' *and add after* 'axillary,' 'or terminal spikes or racemes.'

After description of genus insert key :—

Flowers white, stam. as long as the pet. . . . 1. L. RACEMOSA.
Flowers red, stam. twice as long as the pet. . . 2. L. COCCINEA.

Page 163, after **L. racemosa** *add* :—

2. **L. coccinea**, Wight and Arn. Prod. Fl. Penins. Ind. Or. 316 (1834).

Benth. Fl. Austral. ii. 503. *L. littorea*, Voigt; Kurz, For. Fl. Brit. Burm. i. 469. *L. pentandra*, Griff. Notul. iv. 684.

Fl. B. Ind. ii. 452. Griff. Ic. Pl. Asiat. t. 644 A.

A small glabrous tree; l. subsessile, 2–3 by $\frac{3}{4}$ in. long and broad, cuneate or cuneately obovate, bright green and shining, tip rounded emarginate or obtuse, quite entire, thinly fleshy; fl. in axillary and terminal, spiciform, shortly peduncled racemes, shorter than the leaves, rhachis thickened, scarred after the fall of the fl. or fr.; fl. shortly pedicelled, about $\frac{3}{4}$ in. long, bright rose-red; cal -tube cylindric, lobes short, orbicular-ovate; petals lanceolate; stamens 5–10, often 7, twice as long as the petals, fil. elongate subulate, and style scarlet.

Southern Province. Bentotte river (W. Ferguson, 1894).

Tenasserim, Nicobar Islds., Malaya, Queensland, Polynesia.

Page 203, **Sonerila rhombifolia**. Under this species Dr. Stapf is mentioned as considering it to be a variety of *S. zeylanica*, W. and A., and var. *angustata* to be a distinct species. Dr. Stapfs views are given in a review of the whole genus published in the Annals of Botany, vi. (1892). In that review *S. Arnottiana* is referred to *S. Wightiana*, Arn.; *S. Gardneri*, Thw. var. γ, *Harveyi*, is considered a distinct species; the name *Gunersatnei*, Trim., published in 1885, is adopted as superseding that of *linearis* Hk. f. (1871).

Page 218, 219, under sp. 18 and 20, in citations of 'Fl. B. Ind.,' for 362, *read* 562.

Page 231, line 17 from bottom, for 'Ic.' *read* 'l. c.'

Page 232, in character of **Onagraceæ**, *delete* after l. 'opp. or,' the l. being alt. in all the Ceylon Genera.

Page 274, line 17, after 'bluish-green,' *read* 'dull red when ripe.'—J. C. W.

Page 278, in citation of Fl. B. Ind. after **C. stictocarpum**, for '688,' *read* '681.'

Page 348, last line but one, for 'Bot. Mag.,' *read* 'Bot. Reg.'

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## PART III.

Page 146, line 11, for '36,' *read* '13;' line 26, *insert* 'inflated' *before* 'tube.'—J. C. W.

Page 161, line 14, after dull yellow, *insert* 'at first covered with orange yellow meal.'—J. C. W.

Page 263, line 17, after 222, *insert* 'in part.'—J. C. W.

Page 268, under **U. exoleta,** after line 11, *insert* in separate line, Tropical Asia generally.'—J. C. W.

Page 269, between lines 4 and 5 from bottom, *insert* in separate line, 'Endemic.'

Page 415, **Podostemonaceæ**, 'The descriptions given are very inaccurate as regards the vegetative organs of many of the species.'—J. C. W.—The Indian and Ceylon forms of these remarkable plants are now being monographed by Mr. J. C. Willis, whose rearrangement and descriptions of them will shortly be published. That botanist informs me that *Podost. Gardneri*, Harv., proves to be only the primary axis of *P. olivaceus*, Gard.; also that *P. metzgerioides*, Trim., is the type of a new genus, *Farmeria*, Willis, with one stamen, a sessile fr. and 2 seeds; also that a new form, allied to *P. acuminatus*, Wedd., provisionally named *P. kelensis*, Willis, has been found in the Kehel Ganga, in Dikoya. Its thallus is like that of *Farmeria*, but it has the fl. of *Podostemon*; its fr. splits into two unequal valves.

Page 463, in key, for 'LONGIFOLIUS,' *read* 'LONGIFLORUS.'

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## PART IV.

Page 16, in key for 'RETROVERSA,' *read* 'RETROVERSUS.'

Page 51, line 17, for '398,' *read* '395.'

Page 80, before **integrifolia,** for 'Fl.,' *read* 'H.'

Page 82, under **Trema orientalis,** *delete* 'Moon, Cat. 73.'

Page 100, line 15, for '**zeylanica**,' *read* '**zeylanicus**.'

Page 179, bottom line, for '*E. aloides*,' *read* '*Epidendrum aloides*, L.

Page 246, line 17 from bottom, for 'Harv.,' *read* 'Ham.'

Page 270, in key to **Crinum,** for 'ZEYLANICUM,' *read* 'LATIFOLIUM.'

Page 299, line 9 from bottom, for '*Aclinia*,' *read* '*Aclisia*.'

Page 326, in key to **Phœnix,** for 'FARINIFERA,' *read* 'PUSILLA,' and after line 3 from bottom, *insert* [' Plate xcv.'].

Page 331, line 24, for '*fascicularis*,' *read* '*fasciculatus*.'

Page 372, line 8 from bottom, for '*ouvirandra*,' *read* '*Ouvirandra*.'

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## PART V.

Page 133, under **P. Isachne,** for '*cruciforme*,' *read* '*eruciforme*.'

Page 151, under **P. cæsium,** add in second line, 'Trimen in Journ. Bot. xxiii. (1845) 271,' and in description, for 'stem 2–3 ft.,' *read* 'stem 3–6 ft. or more.'

Page 177, under **A. setosa,** *Trin.*, *insert* '*A. striata*, Nees ex Trim. in Journ. Bot. xxvii. (1889) 170.'

Page 257, under **G. panicoides,** for '181,' *read* '170.'

# INDEX TO PARTS I.–V.

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[*Natural Orders are printed in small capitals; synonyms and species incidentally mentioned in italic type.*]


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* "I am ignorant of the correct spelling of many of these names, and have been unable to give the proper English transliteration in such cases."—Trimen, foot-note to Index, Part II. p. 391.

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Vekkali, ii. 162
Velayil, iv. 80
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Vellaikadampa, ii. 293
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Vellaruku, iii. 185
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# IV.

## ENGLISH NAMES.

[Considering the number of beautiful, interesting, and useful trees, shrubs, and herbs common in Ceylon, it is remarkable that so few of them should have acquired English names. Of those contained in the following index, by far the larger number are of cultivated plants, introduced from Europe or India, whose English or Anglo-Indian names have come with them or been applied to them. A very few are the inventions of English residents, such as 'Lily of the Valley Orchid,' which is Anglican, and 'Patana Oak' and 'Calamander Wood,' which are hybrid words. In a few cases I have introduced into this index English names that are not to be found in the text, with references to plants which certainly should bear them, as 'Water-starwort' for '*Callitriche stagnalis*,' Scop., and 'Barberry' for the Ceylon '*Berberis*,' &c.—J. D. H.]

Ala-bet, *Gynura pseudo-China*, DC. iii. 45
Annatto, dye, *Bixa Orellana*, L. i. 70
Arum, Egyptian, Colocasia Antiquorum, *Schott*, iv. 359
Ash-Pumpkin, *Benincasa cerifera*, Savi, ii. 252

Babul, *Acacia arabica*, Willd. ii. 122
Bael, fr., *Ægle Marmelos*, Corr. i. 229
Balsams, *Impatiens*, i. 200
Banana, *Musa paradisiaca*, L. iv. 265
Banyan tree, *Ficus benghalensis*, L. iv. 86
Baobab tree, *Adansonia digitata*, L. i. 159
Barberry, of Ceylon, *Berberis aristata*, DC. i. 48
Basil, Sweet, *Ocimum Basilicum*, L. iii. 366
Batticaloa Orchid, *Rhynchostylis retusa*, Bl. iv. 187
Bead tree, *Melia Azedarach*, L. i. 244
Bean, French, or Haricot, *Phaseolus vulgaris*, L. ii. 69
Bean, Sacred, of Egypt, *Nelumbium speciosum*, Willd. i. 51
Bedstraw, *Galium asperifolium*, Wall. ii. 373
Bermuda grass, *Cynodon Dactylon*, Pers. v. 274
Betel, foreign, *Piper Betle*, var. *Siriboa*, iii. 425
Betel leaf, *Piper Betle*, L. iii. 425
Betel-nut Palm, *Areca Catechu*, L. iv. 321
Bird-Pepper, *Capsicum minimum*, Roxb. iii. 238
Bitter-cress, hairy, *Cardamine hirsuta*, L. i. 54
Blackberry, *Rubus moluccanus*, L. var. γ, ii. 137
Black strawberry tree, *Melastoma malabathricum*, L. ii. 199
Blinding tree, *Excœcaria Agallocha*, L. iv. 77
Borage, Indian, *Coleus aromaticus*, Benth. iii. 374
Bo tree, *Ficus religiosa*, L. iv. 90
Bottle-Gourd, *Lagenaria vulgaris*, Ser. ii. 247
Box wood, Ceylon, *Canthium didymum*, Gaertn. f. ii. 343
Brazil Cherry, *Eugenia Michelii*, Lam. ii. 188
Bringal, fr., *Solanum Melongena*, L. iii. 235
Bullock's-heart, *Anona reticulata*, L. i. 32
Bull-rush Millet, *Pennisetum typhoideum*, Rich. v. 170
Butter-cup, *Ranunculus sagittifolius*, Hook. i. 4

Cactus, *Opuntia Dillenii*, Haw. ii. 267, and *Euphorbia Antiquorum*, L. iv. 4
Calamander wood, *Diospyros quæsita*, Thw. iii. 97

Calumba, false, *Coscinium fenestratum*, Coleb. i. 41
Candle-nut, *Aleurites triloba*, Forst. iv. 46
Cannon-ball tree, *Carapa moluccensis*, Lam. i. 251
Cape Gooseberry, *Physalis peruviana*, L. iii. 237
Cardamomum plant, *Elettaria Cardamomum*, Mat. iv. 261
Caricature plant, *Graptophyllum hortense*, Nees, iii. 341
Cashew-nut, *Anacardium occidentale*, L. i. 317
Cassava, *Manihot utilissima*, Pohl, iv. 1
Castor-oil plant, *Ricinus communis*, L. iv. 72
Cedar, White, of Madras, *Chickrassia tabularis*, A. Juss. i. 252
Champak tree, *Michelia Champaca*, L. i. 15
Charcoal tree, *Trema orientalis*, Bl. iv. 82
Chay-root, *Oldenlandia umbellata*, L. ii. 316
Chick-pea, *Cajanus indicus*, Spr. ii. 80
Chickweed, *Stellaria media*, L. i. 86
Chickweed, Mouse-ear, *Cerastium vulgatum*, L. i. 85
China-root, *Gynura pseudo-China*, DC. iii. 45
Chiretta, *Swertia Chirata*, Ham. iii. 188
Chittagong wood, *Chickrassia tabularis*, A. Juss. i. 252
Cinnamon, *Cinnamomum zeylanicum*, Bl. iii. 440
Cinnamon, wild, *Litsea zeylanica*, Nees, iii. 454
Citronella oil, *Andropogon Nardus*, L. v. 242
Clover, *Trifolium repens*, L. ii. 20
Cocculus indicus, *Anamirta Cocculus*, Coleb. i. 40
Cock's-foot grass, *Dactylis glomerata*, L. v. 305
Cockspur thorn, *Acacia eburnea*, Willd. [ii. 124
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Coco-nut, King, *Cocos nana*, Griff. iv. 338
Coco-nut, Water, *Nipa fruticans*, Wurmb. iv. 325
Coco-nut palm, *Cocos nucifera*, L. iv. 337
Coffee, Arabian, *Coffea arabica*, L. ii. 353
Coffee, wild, *Scyphostachys coffæoides*, Thw. ii. 335
Colocynth, *Citrullus Colocynthis*, Schrad. ii. 253
Cork tree, Indian, *Millingtonia hortensis*, L. f. iii. 282
Cotton plant, *Gossypium herbaceum*, L. i. 159
Cotton, sea island, *Gossypium barbadense*, L. i. 159
Cotton-tree, *Bombax malabaricum*, DC. i. 160
Cowage or cowitch plant, *Mucuna pruriens*, DC. ii. 62
Crab's-eye seeds, *Abrus precatorius*, L. ii. 57
Croton of gardens, *Codiæum variegatum*, Bl. iv. 52
Croton-oil plant, *Croton Tiglium*, L. iv. 49
Cucumber, *Cucumis sativus*, L. ii. 251
Custard apple, *Anona squamosa*, L. i. 32
Curry-leaf, *Murraya Koenigii*, Spr. i. 220
Cutch, *Acacia Catechu*, Willd. ii. 126, and *A. Suma*, Kurz, ii. 126

Daffodil Orchid, *Ipsea speciosa*, Lindl. iv. 171
Dammar, white, *Vateria indica*, L. i. 132
Dandelion, *Taraxacum officinale*, Wigg. iii. 51
Devil-nettle, *Laportea crenulata*, Gaud. iv. 105
Divi-divi tree, *Cæsalpinia coriaria*, Thunb. ii. 101
Dock, broad leaved, *Rumex obtusifolius*, L. iii. 415
Dock, curled, *Rumex crispus*, iii. 415
Doob grass, *Cynodon Dactylon*, Pers. v. 274
Doon, red, *Doona nervosa*, Thw. i. 121
Dun, *Vatica obscura*, Trim. i. 129
Durian, wild, *Cullenia excelsa*, Wight, i. 162

Ebony, Bastard, *Diospyros Gardneri*, Thw. iii. 96
Ebony, *Diospyros Ebenum*, Kœn. iii. 94
Ebony tree, of S. India, *Diospyros Melanoxylon*, Roxb. iii. 99
Eddoes, *Colocasia Antiquorum*, Schott, iv. 359
Egg-plant, *Solanum Melongena*, L. iii. 235
Elephant apple, *Feronia elephantum*, Correa, i. 228
Elephant grass, *Saccharum arundinaceum*, Retz. v. 202
Elephant's ears, *Actinodaphne speciosa*, Nees, iii. 448
Elephant thorn, *Acacia tomentosa*, Willd. ii. 124
Elm, Indian, *Holoptelea integrifolia*, Planch. iv. 80
Eve's apple, *Tabernæmontana dichotoma*, Roxb. iii. 132
Fever-nettle, *Laportea crenulata*, Gaud. iv. 105
Forbidden fruit, *Tabernæmontana dichotoma*, Roxb. iii. 132
Forget-me-not, *Cynoglossum micranthum*, Desf. iii. 203
Fox-tail Orchid, *Rhynchostylis retusa*, Bl. iv. 187
Furze, *Ulex europæus*, L. ii. 7
Furniture-leaf, *Ficus asperrima*, Roxb. iv. 94

Gall-nuts, *Terminalia Chebula*, Retz. ii. 159
Gamboge tree, *Garcinia Morella*, Desr. i. 96
Geranium grass, *Andropogon Schœnanthus*, L. v. 241
Gingelly oil, *Sesamum indicum*, L. iii. 285
Ginger, *Zingiber officinale*, L. iv. 258
Goat-weed, *Ageratum conyzoides*, L. iii. 13
Gorse, *Ulex europæus*, L. ii. 7
Gram, green or black, *Phaseolus Max*, L. ii. 72
Gram, Madras, *Dolichos uniflorus*, Lam. ii. 77
Guava, *Psidium Guyava*, L. ii. 167
Guava, wild, *Rhodomyrtus tomentosa*, Wight, ii. 166
Guinea grass, *Panicum maximum*, Jacq. v. 153
Gunpowder plant, *Pilea muscosa*, Lindl. iv. 108
Gurjun-oil tree, *Dipterocarpus turbinatus*, Gaertn. f. i. 115

Harebell, *Wahlenbergia gracilis*, A. DC. iii. 58
Hare's-foot Trefoil, *Trifolium arvense*, L. ii. 20
Haricot bean, *Phaseolus lunatus*, L. ii. 69
Hemp, *Crotalaria juncea*, L. ii. 16
Henna, *Lawsonia alba*, Lam. ii. 228
Hill Gooseberry, *Rhodomyrtus tomentosa*, Wight, ii. 166
Hog-Plum, *Spondias mangifera*, Willd. i. 327
Holly, *Ilex*, i. 265
Horse-radish tree, *Moringa pterygosperma*, Gaertn. i. 327
Hyacinth Orchis, *Satyrium nepalense*, Don, iv. 237

Imphee, *Andropogon Sorghum*, Brot. v. 232
Indian Liquorice, *Abrus precatorius*, L. ii. 57
Indian Shot, *Canna indica*, L. iv. 264
Indigo plant, *Indigofera tinctoria*, L., and *I. Anil*, L. ii. 27
Ink-nuts, *Terminalia Chebula*, Retz. ii. 159
Ipecacuanha, wild, *Calotropis curassavica*, L. iii. 149, and *Tylophora asthmatica*, W. & A. iii. 158
Iron-wood, *Mesua ferrea*, L. 105

Jack tree, *Artocarpus integrifolia*, L.f. iv. 99
Jambu, *Eugenia Jambos*, L. ii. 170
Jasmine, Arabian, *Jasminum Sambac*, Ait. iii. 113
Job's tears, *Coix Lachryma-jobi*, L. v. 192
Jowar, *Andropogon Sorghum*, Brot. v. 232

Juda's bag, *Adansonia digitata*, L. f. i. 159
Jujube, *Zizyphus jujuba*, Lam. i. 280
Jungle nail, *Acacia tomentosa*, Willd. ii. 124
Jute, *Corchorus capsularis*, L. i. 181, and *C. olitorius*, L. i. 182

Keppitiya resin, *Croton aromaticus*, L. iv. 47
Khus-khus grass, *Andropogon squarrosus*, L. f. v. 233
Kina tree, *Calophyllum Walkerii*, Wight, i. 104
Kino, Bengal, *Butea frondosa*, Koen. ii. 66, and *Croton aromaticus*, L. iv. 47

Lac, *Gyrocarpus Jacquini*, Roxb. ii. 165
Lemon-oil grass, *Andropogon Schœnanthus*, L. v. 241, and *A. citratus*, DC. v. 246
Lettuce tree, *Pisonia morindæfolia*, Br. iii. 392
Lettuce, Water, *Pistia* Stratiotes, L. iv. 345
Lilac, Indian or Persian, *Melia Azedarach*, L. i. 244
Lily-of-the-valley Orchid, *Eria bicolor*, Lindl. iv. 166
Lime, fr. *Citrus Hystrix*, DC. i. 228
Liquorice, Indian, *Abrus precatorius*, L. ii. 57
Longan, *Nephelium Longana*, Camb. i. 309
Lotus, Egyptian, *Nymphæa Lotus*, L. i. 49
Lotus of Europeans in the East, *Nelumbium speciosum*, Willd. i. 51
Love lies bleeding, *Amaranthus caudatus*, L. iii. 396

Macassar kernels, *Brucea sumatrana*, Roxb. i. 231
Madras Thorn, *Pithecolobium dulce*, Benth. ii. 131
Mahwa tree, *Bassia latifolia*, Roxb. iii. 79
Malabar-nut, *Adhatoda Vasica*, Nees, iii. 338
Mango, *Mangifera indica*, L. i. 318
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Mangrove, White, *Avicennia officinalis*, L. iii. 363
Malay apple, *Eugenia malaccensis*, L. ii. 170
Margosa tree, *Azadirachta indica*, A. Juss. i. 244
Marigold, African or French, *Tagetes erecta*, L., and *patula*, L. iii. 42
Marvel of Peru, *Mirabilis Jalapa*, L. iii. 391
Masan, *Zizyphus Jujuba*, Lam. i. 280
Matara tea, *Cassia auriculata*, L. ii. 106
Mauritius grass, *Panicum muticum*, Forsk. v. 140
Melilot, *Melilotus parviflora*, Desf. ii. 21
Melon, *Cucumis Melo*, L. ii. 251
Mendora, *Hopea* (?) *cordifolia*, Trim. i. 126
Mendora, swamp, *Vatica Roxburghiana*, Bl. i. 128
Mignonette, wild, *Gnaphalium multicaule*, Willd. iii. 32
Melissa oil, Indian, *Andropogon citratus*, DC. (?), v. 246
Milk hedge, *Euphorbia Tirucalli*, L. iv. 1
Millet, *Panicum miliaceum*, L. v. 150
Millet, Bulrush, *Pennisetum typhoideum*, Rich. v. 170
Millet, Indian, *Andropogon Sorghum*, Brot. v. 232
Millet, Italian, *Setaria italica*, Beauv. v. 164
Mistletoe, *Rhipsalis Cassytha*, Gaertn. ii. 266
Moon-flower, *Ipomæa Bona-nox*, L. iii. 213
Mugwort, *Artemisia vulgaris*, L. iii. 43
Mullein, *Verbascum Thapsus*, L. iii. 241
Mustard-tree, *Salvadora persica*, L. iii. 120
Myrobalans, *Terminalia belerica*, Roxb., and *T. Chebula*, Retz. ii. 159

Nettle, Nilgiri, *Girardinia heterophylla*, Dcne. iv. 106

Nettle, Devil or Fever, *Laporta crenulata*, Gaud. iv. 105
Nim tree, *Azadirachta indica*, A. Juss. i. 244
Nilgiri Nettle, *Girardinia heterophylla*, Dcne. iv. 106
Nux-vomica, *Strychnos Nux-vomica*, L. iii. 175

Oak, Ceylon, *Schleichera trijuga*, Willd. i. 304
Oak, Patana, *Careya arborea*, Roxb. ii. 191
Oil, Citronella, *Andropogon Nardus*, L. v. 242
Oil, Geranium grass, *Andropogon Schœnanthus*, L. v. 241
Oil, Gingelly, *Sesamum indicum*, L. iii. 285
Oil, Ginger-grass, *Andropogon Schœnanthus*, L. v. 241
Oil, Gurjun, *Dipterocarpus turbinatus*, Gaertn. f. i. 115
Oil, Kohomba-tal, *Azadirachta indica*, A. Juss. i. 244
Oil, Lemon grass, *Andropogon Schœnanthus*, L. v. 241, 246
Oil, Melissa, Indian, *Andropogon citratus*, DC. v. 246
Oil-nuts, *Aleurites triloba*, Forst. iv. 46
Oil, Rusa-grass, *Andropogon Schœnanthus*, L. v. 241
Oil, Verbena, *Andropogon citratus*, DC. v. 246
Olive, Wild, *Elæocarpus serratus*, L. i. 184

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Palmyra Palm, *Borassus flabellifer*, L. iv. 336
Patchouli, *Pogonostemon suavis*, Pell. iii. 379
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Pepper, black, *Piper nigrum*, L. iii. 427
Pepper, long, *Piper longum*, L. iii. 424
Periwinkle, Madagascar, *Vinca rosea*, L. iii. 130
Persian Lilac, *Melia Azedarach*, L. i. 244
Pimpernel, blue, *Anagallis arvensis*, Lam. iii. 66
Piney varnish, *Vateria indica*, L. i. 132
Physic-nut, *Jatropha Curcas*, L. iv. 46
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Plantain (English weed), *Plantago major*, L. iii. 389
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Primrose Orchid, *Dendrobium heterocarpum*, Wall. iv. 154
Prince of Wales's feathers, *Amaranthus hypochondriacus*, L. iii. 396
Purslane, *Portulaca oleracea*, L. i. 89
Pumpkin, Ash, *Benincasa cerifera*, Savi, ii. 252
Punnai nuts, *Calophyllum Inophyllum*, L. i. 100

Rain-tree, *Pithecolobium umbellatum*, Benth. ii. 132
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Rati seeds, *Abrus precatorius*, L. ii. 57
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Rhea, wild, *Debregeasia velutina*, Gaud. iv. 119
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Rose apple, *Eugenie Jambos*, L. ii. 170
Roselle, *Hibiscus Sabdariffa*, L. i. 154
Rubber, Ceara, *Manihot Glaziovii*, iv. 1
Rubber, Mexican, *Castilloa elastica*, Cerv. iv. 1
Rubber, Para, *Hevea brasiliensis*, iv. 1
Rusa-oil grass, *Andropogon Schœnanthus*, L. v. 241

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Sabre-bean, *Canavalia ensiformis*, DC. ii. 67
Sacred bean of Egypt, *Nelumbium speciosum*, Willd. i. 52

Sandal wood, *Santalum album*, L. iii. 475
San-Hemp, *Crotalaria juncea*, L. ii. 16
Sappan wood, *Cæsalpinia Sappan*, L. ii. 99
Sarsaparilla, *Hemidesmus indicus*, Br. iii. 144
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Sebestens, *Cordia Myxa*, L. iii. 193
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Shola pith, *Æschynomene aspera*, L. ii. 39
Silk-cotton tree, *Eriodendron anfractuosum*, DC. i. 161
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Snake-wood, *Ophioxylon serpentinum*, L. iii. 126
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Sour sop, *Anona muricata*, Dun. i. 32
Sow-thistles, *Sonchus asper*, Vahl, *S. oleraceus*, L. iii. 52
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Strawberry, *Fragaria vesca*, L. ii. 138
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Sugar-cane, *Saccharum officinale*, L. v. 202
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Swamp Mendora, *Vatica Roxburghiana*, Bl. i. 128
Sweet-cup, *Passiflora edulis*, Sims, ii. 242
Sweet-flag, *Acorus Calamus*, L. iv. 365
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Tallow-tree, *Excæcaria sebifera* (*Sapium sebiferum*, Roxb.) iv. 1, 76
Tamarind tree, *Tamarindus indica*, L. ii. 114
Tamarind, wild or velvet, *Dialium ovoideum*, Thw. ii. 113
Tamarisk, *Tamarix gallica*, L. i. 91
Tapioca, *Manihot utilissima*, Pohl, iv. 1
Taro, *Colocasia Antiquorum*, Schott, iv. 359
Tea-plant, *Camellia Thea*, Lindl. i. 112
Tea, Ceylon, *Elæodendron glaucum*, Jacq. f. i. 271
Tea, Ceylon or Matara, *Cassia auriculata*, L. ii. 107
Tea, Wild, *Eurya acuminata*, DC. i. 110
Tea, Wild, of East Coast, *Cassia auriculata*, L. i. 112, ii. 106
Teak tree, *Tectona grandis*, L. f. iii. 350
Telegraph plant, *Desmodium gyrans*, DC. ii. 56
Temple-tree, *Plumeria acutifolia*, Poir. iii. 130
Thorn-apple, *Datura Stramonium*, L. iii. 239
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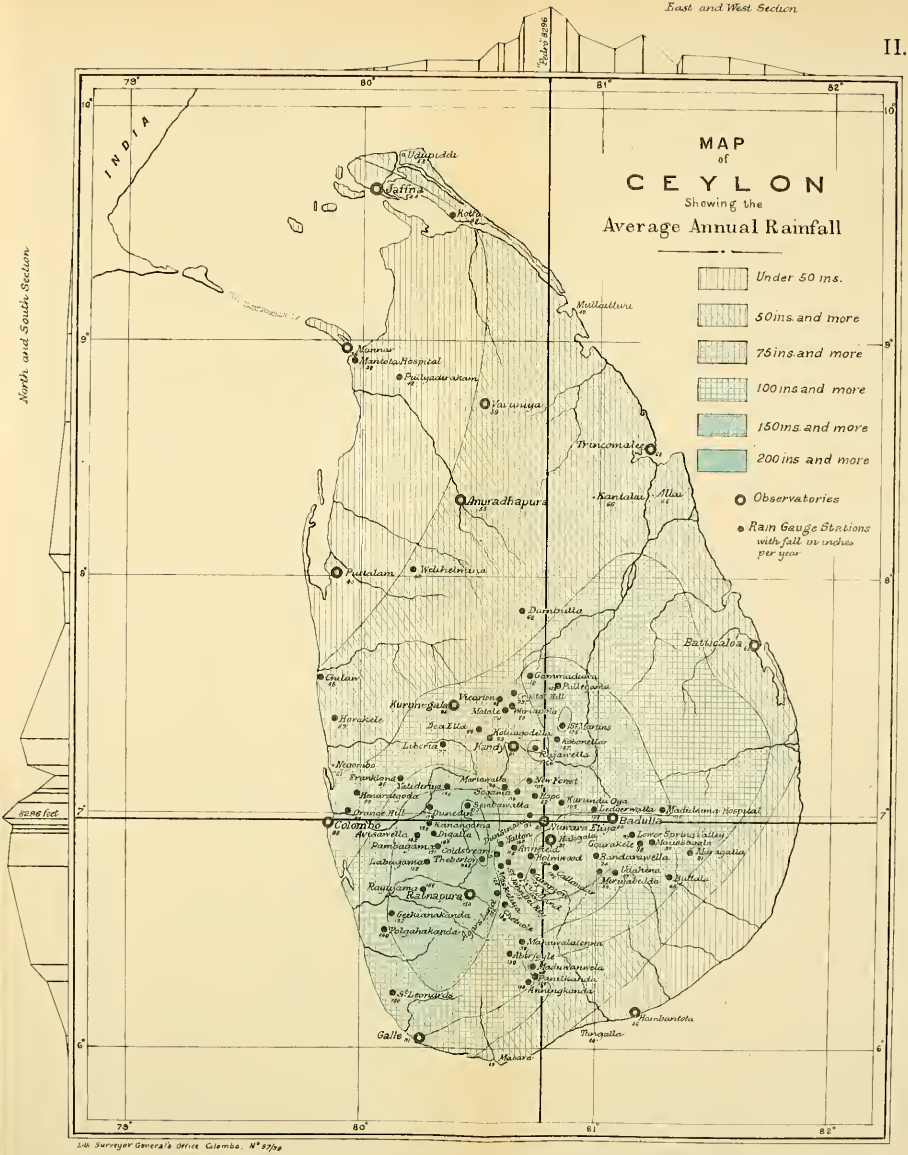
MAP OF CEYLON
showing
ROUGH SKETCH OF FOREST AREAS
BY
Conservator of Forests
Scale 30 Miles to an Inch
INDIA
PALK'S STRAIT
GULF OF MANNAR
BAY OF BENGAL
INDIAN OCEAN
NORTHERN PROVINCE
EASTERN PROVINCE
NORTH CENTRAL PROVINCE
NORTH WESTERN PROVINCE
CENTRAL PROVINCE
WESTERN PROVINCE
PROVINCE OF SABARAGAMUWA
PROVINCE OF UVA
SOUTHERN PROVINCE
Point Pedro
Jaffna
Delft I.
Mannar
Giant's Tank
Arippu
Vavuniya
Trincomalie
Anuradhapura
Kalpitiya
Kalawewa
Minneriya Tank
Dambulla
Nalanda
Batticaloa
Chilaw
Kurunegala
Matale
Kandy
Negombo
Colombo
Badulla
Ratnapura
Panadure
Kalutara
Bentota
Galle
Matara
Dondra Head
Tangalla
Hambantota
79°
80°
81°
82°
10°
9°
8°
7°
6°

II.

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Map I. Showing the Forest Areas of Ceylon.

,, II. Showing the average Rainfall in Ceylon.


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